



This is a digital copy of a book that was preserved for generations on library shelves before it was carefully scanned by Google as part of a project to make the world's books discoverable online.

It has survived long enough for the copyright to expire and the book to enter the public domain. A public domain book is one that was never subject to copyright or whose legal copyright term has expired. Whether a book is in the public domain may vary country to country. Public domain books are our gateways to the past, representing a wealth of history, culture and knowledge that's often difficult to discover.

Marks, notations and other marginalia present in the original volume will appear in this file - a reminder of this book's long journey from the publisher to a library and finally to you.

Usage guidelines

Google is proud to partner with libraries to digitize public domain materials and make them widely accessible. Public domain books belong to the public and we are merely their custodians. Nevertheless, this work is expensive, so in order to keep providing this resource, we have taken steps to prevent abuse by commercial parties, including placing technical restrictions on automated querying.

We also ask that you:

- + *Make non-commercial use of the files* We designed Google Book Search for use by individuals, and we request that you use these files for personal, non-commercial purposes.
- + *Refrain from automated querying* Do not send automated queries of any sort to Google's system: If you are conducting research on machine translation, optical character recognition or other areas where access to a large amount of text is helpful, please contact us. We encourage the use of public domain materials for these purposes and may be able to help.
- + *Maintain attribution* The Google "watermark" you see on each file is essential for informing people about this project and helping them find additional materials through Google Book Search. Please do not remove it.
- + *Keep it legal* Whatever your use, remember that you are responsible for ensuring that what you are doing is legal. Do not assume that just because we believe a book is in the public domain for users in the United States, that the work is also in the public domain for users in other countries. Whether a book is still in copyright varies from country to country, and we can't offer guidance on whether any specific use of any specific book is allowed. Please do not assume that a book's appearance in Google Book Search means it can be used in any manner anywhere in the world. Copyright infringement liability can be quite severe.

About Google Book Search

Google's mission is to organize the world's information and to make it universally accessible and useful. Google Book Search helps readers discover the world's books while helping authors and publishers reach new audiences. You can search through the full text of this book on the web at <http://books.google.com/>

NYPL RESEARCH LIBRARIES

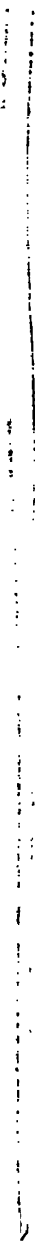


3 3433 07599283 8









CONVENTION

— OF —

Articulation Teachers of the Deaf,

HELD AT THE

INSTITUTION FOR THE IMPROVED INSTRUCTION OF DEAF-MUTES,


Lexington Avenue, between 67th and 68th Streets,

NEW YORK CITY.

June 25, 26, 27 and 28, 1884.

OFFICIAL REPORT.

ALBANY, N. Y.:
EDGAR S. WERNER.
The Voice Press.
1884.



CONVENTION

— OF —

Articulation Teachers of the Deaf,

HELD AT THE

INSTITUTION FOR THE IMPROVED INSTRUCTION OF DEAF-MUTES,


Lexington Avenue, between 67th and 68th Streets,

NEW YORK CITY,

June 25, 26, 27 and 28, 1884.

OFFICIAL REPORT.

ALBANY, N. Y.:
EDGAR S. WERNER.
The Voice Press.
1884.



CONTENTS.

	<i>Page.</i>
The Call for the Convention.....	3
Proceedings in Detail.....	5
Training of Articulation Teachers — Discussion and Resolutions Adopted..	18
The Discussion on Ear-Trumpets.....	24
President A. Graham Bell's Address.....	27
Vice-President Rev. Wm. Stainer's Address.....	30
An American System of Teaching Articulation to Deaf-Mutes. By D. Greenberger.....	31
A Few Thoughts on Several Topics. By Miss Emma Garrett.....	37
Speech-Reading. By Miss Alice C. Jennings.....	43
The Aural System for the Semi-Deaf. By J. A. Gillespie.....	46
Speech-Reading. By Miss Sadie Keeler.....	60
The Mute Consonants, and a Point Concerning Vowel Formation. By Prof. Samuel Porter.....	73
How Shall Our Children be Taught to Read? By Miss Alice E. Worcester.	81
How Shall Our Children be Taught to Read the Newspaper? By Miss Katharine Kletcher.....	92
General Remarks on the Education of the Deaf. By Rev. Wm. Stainer..	99
Some Elementary Language-Exercises. By Miss Caroline A. Yale.....	109
The German System. By Miss S. Hull.....	113
How Best to Make Speech the Vernacular of Our Pupils. By S. Schöntheil.	119
The Various Topics Discussed. By James Howard.....	123
The Oral vs. the Sign-Method. By John Carlin.....	127
Irregularities of English Spelling. By J. H. Brown.....	130
Elementary Voice-Training. By Paul Binner.....	136
Line-Writing and Kindergarten. By Gertrude Burton.....	142
List of Members Attending the Convention.....	155

CONVENTION

— O F —

Articulation Teachers of the Deaf,

HELD AT THE

INSTITUTION FOR THE IMPROVED INSTRUCTION OF DEAF-MUTES,

Lexington Avenue, between 67th and 68th Streets

NEW YORK CITY,

June 25, 26, 27 and 28, 1884.

OFFICIAL REPORT.

ALBANY, N. Y.:
EDGAR S. WERNER.
The Voice Press.
1884.

347952

THE CALL FOR THE CONVENTION.

TO THE FRIENDS OF THE DEAF:

Instruction in articulation and speech-reading has become so completely engrafted upon the American system of educating the deaf that almost all the institutions in the country employ teachers of articulation.

Articulation teaching has thus become a common cause with all instructors of the deaf ; and the desire to improve and perfect methods of giving speech to the deaf is universal.

A convention of teachers of articulation would, undoubtedly, be productive of great good.

1. Each teacher would be stimulated and encouraged by personal contact with others who are engaged in the same work.

2. Considerable diversity of opinion exists regarding the best methods of training the vocal organs, and of teaching the important art of understanding speech by the eye ; hence a friendly discussion of the methods of teaching articulation and speech-reading would certainly lead to improvements in the systems of instruction. A comparison of experiences would be profitable to all. Each teacher would be benefited by the experience of the others, and learn how to do the work better.

3. No convention of the kind has been held in this country since the year 1874. Much experience has been gained since then, and great progress has been made. The number of teachers of articulation has steadily increased, until now there are in the United States and Canada about one hundred and twenty-five persons engaged in this special work ; and through their labors hundreds of deaf-mutes have been taught to speak and to understand the speech of others.

Such considerations as the above led Mr. Greenberger to call a conference of a few of the principals of the articulation schools located near New York, for the purpose of discussing the advisability of holding a convention of articulation teachers this year.

The conference assembled February 27, 1884, in the New York Institution for the Improved Instruction of Deaf-Mutes. Miss H. B. Rogers, of the Clarke Institution, Northampton, Mass. ; Miss S. Fuller, of the Horace Mann School, Boston, Mass. ; Miss E. L. Barton, of the Portland Day School, Maine ; Miss E. Garrett, of the Oral Branch of the Penn. Institution ; Mr. D. Greenberger, of the Institution for the Improved Instruction of Deaf-Mutes, New York ; and Mr. A. Graham Bell, of Washington, D. C., were in attendance.

The conference remained in session until Friday afternoon, and adopted the following resolutions unanimously :

1st. *Resolved*, That a convention be called for the purpose of discussing and improving methods of teaching articulation to the deaf, and of devising means for the promotion of the cause of articulation teaching in America.

2d. *Resolved*, That an invitation extended by the board of trustees of the New York Institution for the Improved Instruction of Deaf-Mutes to hold the convention at that Institution be accepted.

3d. *Resolved*, That all persons practically engaged in teaching articulation to the deaf be entitled to seats as regular members of the convention ; and that all persons who are willing to aid in promoting the objects of the convention be cordially invited to attend as honorary members.

4th. *Resolved*, That Mr. A. Graham Bell, Miss H. B. Rogers, and Miss S. Fuller, the surviving members of the committee of arrangements appointed by the last convention of articulation teachers, which met on the 13th day of June, 1874, at Worcester, Mass., be requested to carry out the foregoing resolutions.

In accordance with the action of the conference, the committee hereby notify all friends of the deaf that the next convention of articulation teachers will be called to order on Wednesday, June 25th, 1884, at 8 o'clock, P. M., at the Institution for the Improved Instruction of Deaf-Mutes, on Lexington Avenue, between 67th and 68th streets, N. Y.

A cordial invitation is hereby extended to all persons who may be interested in the subject of teaching articulation and speech-reading to the deaf, as well as to all who are practically engaged in the work of instruction.

The trustees of the Lexington Avenue school will be happy to accommodate, as their guests in the Institution, all members of the convention, and will do everything in their power to make the occasion agreeable.

Mr. Greenberger, the principal of the Institution, will act as local committee, and it is requested that all who intend to be present will notify him at as early a date as possible, so that suitable arrangements may be made with the railroad companies for reduced fares.

The following topics are suggested for consideration at the convention :

1. First steps in articulation teaching.
2. Voice-training.
3. Speech-reading.
4. Classification of the deaf in regard to articulation teaching.
5. Artificial aids to hearing.
6. How best to make speech the vernacular of our pupils.
7. Difficulties experienced by deaf articulators on account of the irregularities of English spelling.
8. Articulation as a means of instruction.
9. Prerequisites of a teacher of articulation.
10. History of the methods of teaching speech to the deaf.
11. The best means of promoting the cause of articulation teaching in America.
12. Statistics and results of articulation teaching in America.

All those who intend to present papers on one or more of the above topics, or on other subjects of similar character, are requested to notify the local committee as soon as possible.

The friends of the deaf are earnestly requested to coöperate with us in our efforts to advance the cause of articulation teaching in America.

ALEXANDER GRAHAM BELL, }
 HARRIET B. ROGERS, } *Committee.*
 SARAH FULLER, }

SCOTT CIRCLE, WASHINGTON, D. C.

PROCEEDINGS IN DETAIL.

FIRST DAY.

Wednesday, June 25, 8 P. M.

About 200 persons attended the opening meeting of the convention, which was called to order by Prof. A. Graham Bell, who read the call for a convention, and expressed gratification that so many friends of the deaf were present, heartily coöperating in the efforts to promote the welfare of this class of persons.

Rev. Frederick D. Wines, Secretary of the Illinois State Board of Charities and Special Agent of the Tenth Census, was elected temporary chairman; and Mr. Abel S. Clarke, of the American Asylum, Hartford, Conn., temporary secretary.

[NOTE. — At the first occurrence of a name, the address and position of the person will also be given.]

TEMPORARY CHAIRMAN WINES'S REMARKS.

I am glad to be able to state that the tabulation of the information collected in the census respecting the deaf is now complete, with the exception of the tabulation of the causes of deafness, which will be done within the next week or ten days. I have not the precise figures at hand, but I know that there are about 35,000 deaf and dumb in the country. About one-half of them — perhaps not quite one-half — are of school age; that is, between the ages of five and twenty-one years. How many of them have received an education in the schools, it is impossible for me to say; but, certainly, not one-half of them. There must be in the United States, I think, not less than 5,000 deaf children who are of proper age to attend school, who have never seen the inside of any institution, and this presents to us a problem of very great importance. How are we best to secure the education of these uneducated mutes? I confess that I have come here personally without any proposition in favor of any method of instruction, anxious only to learn from you what degree of success has thus far attended the efforts to impart instruction by the articulate method, but with this thought in my mind, that if it should not prove to be feasible to enlarge the institutions which already exist, or in the larger States to create new ones of sufficient capacity to contain all the children who need education, then it may be expedient to develop more fully the system of day schools which has recently sprung up in large cities, and I have come here more for the purpose of obtaining light on this question than for any other single purpose.

APPOINTMENT OF COMMITTEES.

The following committees were appointed:

Committee on Credentials — Mr. E. H. Currier of the N. Y. Institute for Deaf-mutes;

Miss E. L. Barton, of the Portland Day School; Miss K. H. Austin, of Rhode Island.

Committee on Permanent Organization — Miss Caroline A. Yale, of the Clarke Institution, Northampton, Mass.; Miss Lizzie Moffat, of N. Y. Inst. for Improved Instruction of Deaf-mutes; Miss Ella Jordan, of Horace Mann School, Boston; Miss Emma Garrett, of Oral Branch Penn. Inst., Phila.; Miss Caroline R. Lounsberry, Englewood, N. J.

Committee on Rules, Regulations and Business — Miss Harriet B. Rogers, of the Clarke Inst., Northampton, Mass.; Miss Sarah Fuller, of Horace Mann School, Boston; Rev. Wm. Stainer, London, Eng.; Mr. D. Greenberger, N. Y. Inst. for Improved Instruction of Deaf-mutes; Mr. Paul Binner, Milwaukee Phonological Institute.

During the deliberations of the committees letters of regret were read from friends of the articulation method, in various parts of the country and in Great Britain.

Mr. David Greenberger, Principal of the Institution for the Improved Instruction, of Deaf-mutes, New York : I am exceedingly happy to see that so many friends of the deaf have responded to the call. Those who are not advocates of articulation teaching are equally welcomed. I hope this convention will be as successful in every other respect as it is in point of numbers.

PERMANENT OFFICERS.

The Committee on Permanent Organization reported for

President—Prof. Alex. Graham Bell, Washington, D. C.

Vice-Presidents—Rev. Wm. Stainer, London, Eng.; Miss Harriet B. Rogers, Clarke Inst., Northampton, Mass., Miss Sarah Fuller, Horace Mann School, Boston.

Secretary—Dwight L. Elmendorf, Inst. for Improved Instruction of Deaf-mutes, N. Y.

The report was accepted; and Dr. Isaac L. Peet, Principal of the N. Y. Inst. for Deaf-mutes, and Mr. P. G. Gillett, Principal of the Illinois Inst., were appointed a committee to conduct Prof. Bell to the chair.

Vice-President Stainer offered prayer.

[See elsewhere for the opening addresses of President Bell and Vice-President Stainer.]

Mr. Greenberger stated that as several of the teachers had expressed a desire to see illustrations of the method taught in this institution, he would cordially invite all present to attend an exhibition of the method at half past nine, Thursday morning.

Mr. J. L. Noyes, of Minnesota, stated that the Rev. W. W. Turner, of Hartford, sends his hearty congratulations and a Godspeed to the convention. A vote of thanks was directed to be sent to Mr. Turner for his cordial greeting.

Dr. Peet spoke in regard to the merit due Rev. Wm. Stainer for his efforts in behalf of those deaf-mutes in London who formerly received no education of any kind. Dr. Peet thought that Mr. Stainer, in his modesty, had not fully shown the great work he had accomplished in London. The city officials had provided for the education of only half of the deaf children, leaving 300 uncared for. For these 300 Mr. Stainer has established schools in the various parts of the city and is teaching them by the oral method, whereas the other 300 receive instruction by the sign-method. If any man in England deserves to be honored, it is Mr. Stainer.

Adjourned until Thursday, 10 A. M.

SECOND DAY.

Thursday, June 26, 10 A. M.

President Bell in the chair.

Mr. P. G. Gillett opened the session with prayer.

Minutes of Wednesday's session were read and accepted.

MESSAGES OF REGRET.

Miss Harriet B. Rogers presented the following messages of regret :

From Mr. B. St. John Ackers, Painswick, Eng.:

Please accept our hearty thanks for your kind and pressing invitation to the third convention of American articulation teachers. Be assured that had it been at a time possible for us to attend, nothing but being forbidden on pain of death (such is the sentence of my medical advisers) would have kept me away from such a deeply-interesting meeting. June is just the busiest month of our busy season in connection with all things in England, and our college especially. On the very week of your convention, we are holding a mediaeval market in hopes of raising some portion of the £20,000 we so urgently need. You may be sure our best wishes will be with the convention, and I am more pained than can be expressed, at the barrier, that

absolute barrier [meaning the ocean], ever to exist between America and England. Please give my kindest remembrances to all whom I know personally, and kind regards to those whom we know by writings and name only, and wish one and all Godspeed in the great work.

From Arthur Kinsey, of Ealing, London, Eng., Principal of the College for Training Teachers of the Deaf and Dumb:

You will doubtless by this time have learned how impossible it will be for any members of this society to be present on that important occasion, as we shall be busily engaged in collecting ways and means at a big bazar to carry on our work. I trust that your convention may be fully successful in promotion of much good to the cause. Please give my kindest regards to all friends attending it.

From Miss Hull, Lady Principal of the Training College of Teachers of the Deaf and Dumb, Ealing, London, Eng., was received a letter expressing her regrets, and enclosing a paper to be read before the convention.

From Richard Elliott, Asylum for the Deaf and Dumb, Old Kent Road, London, and Victoria Road, Margate, Eng.:

I regret very much my inability to join in the convention to which I have been so kindly invited. I shall be much interested to know the result of the deliberations and trust that I may be favored with a copy of the report. Allow me to express the earnest wish that the convention may be productive of much good to the cause of deaf-mute education.

Voted, that the letters be put on the minutes.

The Committee on Business reported as follows:

1. That the rules of proceeding shall be those contained in "Cushing's Manual."
2. That the following papers be presented to the convention [as hereafter given in the report of the proceedings].
3. That the duration of the sessions be in the morning from 10 to 12, and in the afternoon from 3 to 5 o'clock.

Mr. David Greenberger read a paper on "An American System of Teaching Articulation to Deaf-Mutes."

[NOTE. — The papers and ensuing discussions will be found elsewhere in the report. For convenience, see "Table of Contents."]]

Miss Alice E. Worcester, of the Clarke Inst., Northampton, Mass., read a paper on "How Shall Our Children be Taught to Read?"

Adjourned until 3 P. M.

Thursday, June 26, 3 P. M.

President Bell in the chair.

The paper of Miss Alice C. Jennings, of Auburndale, Mass., entitled "Speech-Reading," was read by President Bell.

Mr. J. A. Gillespie, of the Nebraska Inst., read a paper on "Aural Instruction of the Semi-Deaf."

Miss Mary McGowen, of the Chicago Voice and Hearing School, gave illustrations of the progress made by some pupils under the aural system as taught by her.

Adjourned until 7:30 P. M.

Thursday, June 26, 7:30 P. M.

President Bell in the chair.

Mr. L. Greenberger presented the following letter, which was read by the secretary:

ENNISKILLEN, CANADA, *June 23, 1884.*

Mr. D. Greenberger,

MY DEAR SIR: Enclosed herewith you will find my paper. I find that I cannot be present with you, owing to the death of my father. Kindly have my paper read, and please acknowledge the receipt of this by return mail to the above address. It is a source of much regret, apart from family trouble, that I am unable to be present with you. You have my best wishes for the success of the convention.

Yours truly,

J. H. BROWN.

Mr. Greenberger moved that a committee of two be appointed to draft resolutions, expressing the sympathy of this convention ; that these resolutions be forwarded to Prof. Brown, and that this action be entered upon the minutes of this meeting. Carried.

President Bell appointed Mr. D. Greenberger and Rev. Wm. Stainer as such committee.

Prof. Samuel Porter, of the National Deaf and Dumb College, Washington, read a paper on "Mute Consonants;" also a paper on "Vowel Formation."

Mr. Paul Binner read a paper on "Elementary Voice-Training."

Voted, that a Committee on Necrology consisting of Mr. P. G. Gillett, Miss Sarah Fuller and Prof. A. G. Bell, be appointed to report to this convention.

Mr. P. G. Gillett mentioned that the Fifth Conference of Principals would be held July 9th, at Faribault, Minnesota.

President Bell mentioned that the convention of teachers at Madison, Wis., had extended a cordial invitation to the friends of the deaf.

A COMMITTEE TO RECOMMEND TESTS OF HEARING.

Mr. J. L. Noyes presented the following resolution, which was adopted :

WHEREAS, It is the belief of this convention that there is in all of our schools for the deaf a considerable number of pupils who have more or less hearing ; and

WHEREAS, More effort should be made to cultivate the sense of hearing in these pupils,

Resolved, That a committee consisting of Prof. A. G. Bell, of Washington, Prof. S. C. Gordon, of Washington, and Prof. F. Clark, of New York, be appointed to consider this important subject, and to recommend to the profession through the *American Annals*, at their earliest convenience, such tests of hearing, such methods of treatment and cultivation, as in their judgment the subject demands and the best interests of the deaf require.

Adjourned until Friday, 10 A. M.

THIRD DAY.

Friday, June 27, 10 A. M.

Before the morning session Miss Worcester gave an elaborate exposition of her method for teaching English spelling.

Miss McGowen gave an exhibition of the power of hearing of two little boys, explaining her method of developing and improving the hearing of partially deaf persons.

President Bell in the chair.

Dr. Ely, of Maryland, opened the session with prayer.

Minutes of Thursday's sessions were read and accepted.

REPORT OF COMMITTEE ON CREDENTIALS.

The Committee on Credentials presented the following report which was accepted :

Owing to the failure of a large number of delegates to register, your Committee on Credentials find it impossible to make a full report. It is known that more than 200 have been in attendance during the sessions of the convention. Only 150 have registered ; 115 of these are teachers of articulation, representing 38 schools. [See list in another part of the report.]

Vice-President Stainer read a paper by Miss S. Hull, of London, Eng., on "Several of the Topics Mentioned in the Call." He then read a short paper of his own ; also a poem, entitled "The Dumb Spake," by D. Buxton, London, Eng.

"THE DUMB SPAKE."

"Luce dell' alma è la parola." — *Caparozzo*.

They never heard a mother's thrilling voice ;
They had not learned to utter love's sweet word ;
The welcome sounds which bid your hearts rejoice
Fall on their fettered sense unfelt, unheard.

Yet *mind* they have : the marvelous power to grasp
 High thought, inspiring Hope and kindling Faith.
 With language, these are all within their clasp ;
Without it, life were but a living death.

And *voice* they have : it is for us to break
 The weary silence which has kept them dumb ;
 To bid the vivid eye the message take,
 Which, to the ear, will never, never come.

And now, no longer mute, on loving lips
 They read the words which loving hearts express ;
 Their darkness lightened to a faint eclipse,
 In living words, the deaf the hearing bless.

Voted, that the first hour of the afternoon session be devoted to miscellaneous business.

Prof. Gordon : I would move that the ladies present be invited to write questions upon subjects relating to the teaching of articulation and lip-reading for a "question-box," and that these questions be considered during this hour devoted to miscellaneous business.

President Bell : I think that we must all have remarked that while the majority of articulation teachers are ladies, that the majority of the speakers have been gentlemen. We have been very glad to hear from those ladies who have ventured to ask questions and make remarks, and we are glad to have more come forward, and I rather approve of the suggestion made by Prof. Gordon.

Mr. L. J. Dudley, of the Clarke Inst., Northampton, Mass.: There might be some feeling of delicacy about it unless the lady who asks the question designates the person she wishes to answer. She might say will Mr. or Miss So-and-So please answer the following question? Then the person will feel no hesitation in replying, whereas if the question is put indefinitely those most competent to answer may have a delicacy in answering.

Prof. Gordon's motion was carried.

Adjourned until 3 P. M.

Friday, June 27, 3 P. M.

President Bell in the chair.

QUESTION-BOX.

President Bell : I am glad to see that the suggestion of a question-box has been responded to by several of the members of the convention. The first question addressed to me is —

"How far is it possible to educate those who are entirely deaf in the matter of pitch?"

Experiments that I have made show that persons who are entirely deaf have a certain limited perception of pitch. All deaf persons can tell whether their voice is high, they can tell whether their voice is low pitch, and they can tell intermediate pitches to some extent. To what extent I cannot answer from my own researches, as I saw no practical end in aiming at nice distinctions of pitch. I know two ladies, who are entirely deaf, and yet who have a perception of relative pitch; one is congenitally deaf, and the other became deaf. For instance, they can sing; if you strike the key-note Do, they can sing Do, and they can strike these relative pitches. To what extent the pitch could be developed I don't know; and I did not see any practical end in view, and that is the reason why my experiments have not been carried out very far. Of course, I don't see any practical end to be attained in teaching a deaf person to sing, and the precision of definite pitch is not necessary in modulating the voice.

The second question is —

"Does Prof. Bell still advocate the use of his physiological symbols in teaching the deaf to speak?"

Certainly I do. I advocate a greater use of them, and I advocate even simplifying and making the characters so simple that even the youngest child can use them and that teachers

can use them with greater facility. In my paper that I shall present to this convention I actually advocate a shorthand form of Visible Speech, called by my father Line Writing, because you can use it with such rapidity. The great objection to ordinary symbols is that we use in our schools the printed form of the letters. We have several forms of alphabets; we have printed characters, we have script characters. Now if you are communicating with a person by writing, if you are obliged to communicate by capital letters, it will be a pretty slow and difficult thing, and so in using my father's physiological symbols. I am proposing a greater use of them than has ever been made, and using the shorthand form of the character so that we may write with the speed of speech more nearly than with the speed of printing.

"Do his teachers use Visible Speech in his school at Washington?"

My school at Washington has been a little experimental school to test the applicability of the shorthand form of Visible Speech for the use of very young children — and that form of Visible Speech has been used entirely in this experimental school with the object of seeing how far it might be practical to use that as the handwriting of the school, using, however, at a later period, the ordinary symbols that you know — the printed form of characters as printed characters. So we do use Visible Speech in the school, but we have been using, as an experiment for sometime past, the shorthand form of the characters as given in my father's work, which is well known to teachers of the deaf, — "Universal Line Writing or Steno-Phonography on the Basis of Visible Speech." Teachers of the deaf are also familiar with the script line. Stenography was introduced for universal shorthand reporting, and it is that form that I am experimenting with in this school at Washington.

President Bell: Here is a note addressed to Miss Rogers or Miss Yale: —

"Do you agree with Miss Hull that the best place to learn methods of articulation is in German schools?"

Miss Rogers. I have preferred, instead of getting all my ideas on methods of instruction based on one school or one country, to get from all countries and from all schools. I have visited some of the best German schools and got some very good ideas in 1872, but I should not wish to be bound by the methods taught in any one school whether in Germany or in this country.

President Bell [reading]: "The writer would like to have some expression of opinion from the articulation teachers present as to whether the gratifying results spoken of in the youngest class at Northampton are not due to the skill and experience of Miss Worcester rather than to the method described in her chart; which seems to the writer, like the Visible Speech symbols, — most excellent in itself, but not being in current use among hearing people, of less value than the diacritical marks which are. Will Mr. Binner give his views on that point?"

Mr. Binner: It seems to me that it would be necessary, in order to answer this question, to compare the year's work at Northampton with another class which have not been taught in that way. I hold firmly to the opinion that the great results obtained there are due to Miss Worcester's great skill as a teacher. Many another teacher might take that method which she employs and would not obtain the same results, not because that one is not a good teacher, but because that method is not fitted to that teacher. Methods are a peculiar thing; they don't fit to everybody. Before we take up new methods we want to be careful and see whether they are really ours, whether they can become part of ourselves. As to the diacritical marks, perhaps the writer knew that I used them and therefore drew me out. I use diacritical marks, and I cling very firmly to them. The method that Miss Worcester employs — what is the use of that? Why, the child is taught to spell. That is what I do by using diacritical marks. It is the spelling we want to get at. Now, I will just relate a little incident that came to my knowledge last year when I opened my school. A little girl came who had been five years in the St. Louis Institution, and she was then twelve years of age,

and wanted to learn to speak. The second day she came to my school she brought a dictionary with her and she let me understand that there were the diacritical marks on the alphabet and here they were in the book. And, later on, she would be able to pick out the words and pronounce them herself, and I felt a good deal more firmly based on the idea that I hold in regard to diacritical marks, and I have gone right on doing that kind of work. Another teacher might take up the diacritical mark system and not do as well; he might do better with Miss Worcester's. It is a question, as you will see, that it is very difficult to give a definite answer to. I, for my part, like the diacritical marks. I just want to say this: We are both, of course, working toward the same end, but I giving the diacritical marks to a child, Miss Worcester teaching in her way. Will the word-picture not impress itself upon the child's mind in the same way exactly? Will the child not learn to spell—that is the thing—both ways? But here I give the diacritical marks, and in some cases that I have mentioned before, where the child has some education and now comes to a speaking school, won't that child have right away an aid to studying language, to help itself along? It will make the child, it seems to me, more ready for home studies. I think I have answered this as fully as I can.

President Bell: I find there is another question addressed to myself:

"In teaching the deaf articulation would you advise a teacher to use the voice?"

I would, certainly. I think we should aim to be as natural as we can. I think we should get accustomed to treat our deaf children as if they could hear, and if we get into the habit of articulating to deaf children without voice in this way we make a distinction between them and hearing persons. We should try ourselves to forget that they are deaf. We should teach them to forget that they are deaf. We should speak to them naturally and with the same voice that we speak to other people, and avoid unnatural movements of the mouth or anything that would mark them out as different from others.

Prof. Gordon: Allow me to ask if it is not desirable or advisable, in the very first place, to emphasize these movements a little and gradually come to the more common forms of expression?

President Bell: There is a diversity of opinion, of course, upon such a point as that. My belief is that you will never come to speak to your child naturally if you begin to speak in that way. I advocate talking to a deaf child just as if he could hear. A child won't understand you at first, and it is necessary that there shall be some means by which you reach the child's mind. I advocate artificial means, but not the distortion of the mouth. I would keep the mouth-picture as we find it in the outside world. We may make the artificial distinctions in the elementary sounds. Take the sounds *p*, *b* and *m*, which are liable to become confused. We may make artificial distinctions and have perfect intelligibility, from our pupils; but when they go out in the world they don't find those distinctions. Whatever artificial means may be employed to increase the intelligibility, I would not touch the mouth. I would aid it by writing, by symbols, by a manual alphabet, and in my paper I propose the use of a manual alphabet read by the sense of touch. I supplement the deficiencies of the eye in young children. I do think it is a matter of importance in presenting spelling to our deaf children. We should be careful to present to them what they will find outside among their friends, and in the public, and not make artificial distinctions in the mouth by exaggerated movements that would distort the natural appearance of speech.

[See elsewhere for discussion and resolutions on "Training of Articulation Teachers."]

REPORT OF THE COMMITTEE ON NECROLOGY.

The following report of the Committee on Necrology was adopted by the convention:

During the ten years which have intervened since the teachers of articulation in America were brought together in convention, the following named persons have ceased their labors,

and have entered into rest: Mr. Arnold, of Riehen, Switzerland; Monsieur Houdim, of Paris, France; Padre Marchio, of Milan, Italy; Mr. Zera Whipple, of the Mystic River School, Connecticut; Miss Cornelia Trask, of the Illinois Institution for the Deaf and Dumb; Miss Julia Sweet, of the American Asylum, Hartford, Conn.; Miss Annie E. Bond, of the Horace Mann School, Boston, Mass.

It is unnecessary, here, to indulge in any words of fulsome adulation of these persons, whose lives were full of devotion to the cause of educating the deaf, and of bringing them into the closest possible relations with their more favored fellows. It is, however, fitting that, as instructors of the deaf, we place upon record the evidence of our appreciation of their valuable labors, and commend their lives as worthy examples for imitation and emulation.

While regretting their loss from our midst, we rejoice, that they, being dead, yet speak.

PHILIP G. GILLET,
ALEXANDER GRAHAM BELL, } *Committee on Necrology.*
SARAH FULLER,

THE CONVENTION OF AMERICAN INSTRUCTORS OF THE DEAF AND DUMB REQUESTED TO COÖPERATE.

Prof. Gordon: After a hurried consultation with a number of our friends, to whom I have presented the substance of the resolutions which I hold in my hand, I venture to present them to the convention for its action:

Resolved, That the convention of American Instructors of the Deaf and Dumb be requested to organize a section of the convention for the promotion of articulation teaching.

Resolved, That this request be transmitted to the executive committee at the convention.

I will say, by way of explanation, that the convention of American Instructors of the Deaf and Dumb is the only body that embraces within itself all teachers of the deaf and dumb, and that it has had a number of national conventions at which we have considered all matters more or less appertaining to the education of the deaf, and that these resolutions are only in the line of what has actually been our course in the past, especially at the last meeting which was held in the Illinois Institution. During the meetings of the large convention held there, there were informal conferences held by the teachers of articulation who were present, who enjoyed the meetings very much and received great benefit from them. There were also informal conferences with reference to religious instruction and with reference to elementary language instruction and other matters. Now it is proposed to take formal action so that the proceedings, which will be important and of interest, may be recorded as part of the proceedings of the convention.

Dr. F. M. Gallaudet, of the National Deaf-Mute College, Washington: I shall be very much pleased as a member of this convention to sustain the resolutions which have just been offered and to urge their adoption. They certainly commend themselves to my judgment as eminently wise, and the probable result of the action suggested by these resolutions is calculated to do great good to the cause of teaching speech to the deaf. If I may be allowed to say a word in my capacity as chairman of the national convention of American Instructors of the Deaf and Dumb, I can certainly say in that capacity that it will give me pleasure, if these resolutions are adopted by this convention, to receive them as the recognized organ of the standing committee, to lay them before the committee at a meeting that will probably be held in a few weeks at Faribault in connection with a gathering there of heads of institutions in this country. I am sure that the convention of American Instructors of the Deaf and Dumb is an organization broad enough and catholic enough to receive all who are working in the interest of giving speech to the deaf. That has been the spirit of former conventions; that will be the spirit of future conventions, and I accept the offering of these resolutions as a most gratifying assurance of the continuance among American instructors of the deaf of that spirit of harmony of which it has been my pleasure to boast on the other side of the water, and to say to our brethren there that in this country we can entertain even wide differences of opinion as to methods, but we can shake hands over the grand system which exists, and which I am happy to say is recognized in the call which came from the Scott Circle

in Washington bringing this convention together. I read in the first paragraph that called the convention the words, the "American system of educating the deaf," and I rejoice that that system to-day includes all methods that are believed to be of value to any class of the deaf; and so I trust that we may go forward in this work in the future harmoniously, each respecting the differences of opinion that exist and working forward for the good of all. I am sure, if I may add this word in seconding these resolutions, that the vast majority of the teachers of the deaf in this country are working on the principle that the fittest must survive; and, if it be proved in the future, as the result of articulation teaching to the deaf, that a far greater proportion of the deaf can be taught to speak well than has been supposed by some of those who have been laboring for the welfare of the deaf, they will be the ones most delighted to accept the proof that such results are possible. We shall go forward, I am sure, with our labors after this convention with renewed enthusiasm for that particular development among the deaf that this convention was called to urge and advance, and I say here most heartily, Godspeed the cause of giving speech to the deaf, and may He grant that the day shall come when the number who cannot be taught to speak shall be reduced to the smallest possible minimum.

The resolutions were then adopted.

Miss Emma Garrett's paper, on "Several Topics Mentioned in the Call," was read by her sister, Miss Mary Garrett.

Adjourned until 7:30 p. m.

Friday, June 27, 7:30 P. M.

Owing to a slight indisposition of President Bell, Vice-President Stainer occupied the chair. Miss Katharine Fletcher, of the Clarke Inst., Northampton, Mass., read a paper entitled "How Shall Our Pupils be Taught to Read the Newspaper?"

Owing to the absence of Miss Sadie Keeler, of the N. Y. Institution for the Improved Instruction of Deaf-mutes, her paper, "Speech-Reading," was read by Secretary Elmendorf.

Mr. Greenberger explained that Miss Keeler expected to attend the convention, but owing to the sudden change in the plans of her friends, she had sailed for Europe yesterday.

Mr. Greenberger introduced Mr. Isaac Rosenfeld, the venerable president of the New York Institution for the Improved Instruction of Deaf-mutes. Mr. Rosenfeld, in addressing the convention, referred to the education of his daughter, who is deaf. [See discussion after "Speech-Reading" by Miss Keeler.]

Conversation was held between Ada B. Smith, pupil of the N. Y. Inst. for Improved Instruction of Deaf-mutes, and Lottie F. Bailey, pupil of the Horace Mann School, Boston, to illustrate speech-reading between deaf-mutes. [See discussion after "Speech-Reading" by Miss Keeler.]

Adjourned until Saturday, 9:30 A. M.

FOURTH DAY.

Saturday, June 28, 9:30 A. M.

President Bell in the chair.

Dr. Gallaudet opened the session with prayer.

The minutes of Friday's sessions were read and accepted.

President Bell: I may mention to the convention that I have received a private telegram from my father-in-law, the Hon. Gardner Green Hubbard, who is well known to you all in connection with articulation teaching, as the pioneer of that system and the first president of the Clarke Institution, who would have been glad to have joined us in our deliberations had it not been for grievous illness in his family. I shall, if no one objects, instruct the secretary to make a minute of the fact that Mr. Hubbard would have been here but for that cause.

I wish to make one or two announcements. It has been stated at this meeting that there is to be a convention of the National Teachers' Association at Madison, Wis., from the 15th to the 18th of July, and that all teachers and friends of the deaf have been invited by the Teachers' Association to be present at their meeting. I have been specially invited by the Association to read a paper on the subject that I brought before the National Academy of Sciences, on the formation of deaf classes in the public schools. This is a subject of some importance in regard to articulation, as I think that these deaf classes, especially if taught by articulation, would be stimulated by contact with the hearing pupils of our public schools. However, I will not enter into details, but simply let articulation teachers know that that subject, of great importance to them, will be brought forward before the National Teachers' Association. You will find, up-stairs, programs as to the rates of fare and other information concerning that teachers' convention.

A SOCIETY TO PROMOTE ARTICULATION TEACHING.

There is also another statement I should like to make. I have alluded to the proposed project of the formation of a national association or society for the advancement and promotion of articulation teaching. I was aware that Mr. Spencer, the president of the Wisconsin Phonological Institute, of which we have a representative here to-day, had intended to present a paper on the subject of the formation of a national assembly. By an accident, that paper has not been received. He sent the paper to me in Washington after I had left there, and it is now following me about the country. I have been traveling, and it will reach New York probably after the convention has adjourned. I wish all the members to know that there is a project, the details of which I can't exactly define, for the formation of a society or national association for the promotion of articulation teaching, to receive bequests and collect funds for that purpose, with the special object of disseminating information concerning articulation teaching, reaching the parents of deaf children and giving them information as to what is being done in teaching deaf children to speak, and giving them names of schools and institutions where they may see the results that are being obtained. I am not prepared to give any description of that plan as I don't know exactly the nature of it. I don't know whether Mr. Binner knows exactly the nature of it, but at all events I would suggest that if there are any members of this convention who desire to know what steps are proposed to be taken that they will send their names and addresses to me and I shall be happy to keep them informed. If you have any explanation, Mr. Binner, to make concerning Mr. Spencer's scheme, I should be very glad.

Mr. Binner: I can't say much more than has been said upon this subject. The idea is to form an association consisting of friends of the deaf which will be classified into such as are active members, who will pay \$5 a year. That is the plan that was laid out in general, of course, subject to your modifications. Then there was to be another class, friends of the deaf who would be called benefactors—such as give large sums to the object—and a third class which would be called life members upon paying a certain sum. Then the fourth class would be the teachers, which class would be supposed to do the practical work. The object is, of course, to forward the teaching of deaf-mutes by articulation methods, and also the publication of an organ specially for our purposes. That is about the general outline of the plan.

"THE VOICE."

President Bell: There is another announcement I would like to make. We are not the only articulation teachers in America. It may not be known to teachers of the deaf that there is already established in America an organ of communication between teachers of articulation—not of deaf but of hearing persons, who are engaged in the correction of defective speech; persons who are engaged in the study of oratory and subjects of that kind. Many of you may know of THE VOICE, which is a progressive paper. The editor of THE VOICE has been present

with us during all our sessions, and the full proceedings of this convention are to be published in *THE VOICE*, and it would be well for articulation teachers to know that there is such a journal. It is the only journal in the world devoted to the subject of articulation teaching, and I would like to see teachers of the deaf as well as teachers of the hearing support it. At the same time I don't approve of a special journal for teachers of articulation as apart from the *Annals*. We have in the *American Annals*, which of course is a quarterly, probably the best special journal that has ever appeared. But it seems to me that for persons who wish to be set in communication with other teachers of articulation, this monthly periodical would be of great use, and for all the permanent results of your investigation in articulation we would probably find a place in the more ponderous and serious quarterly, the *Annals*. I simply make that remark.

CARE TO BE TAKEN IN TESTING THE HEARING.

There is one further remark I should like to make. We have spent one session in discussing the education of the sense of hearing. Now, you will all go home; you will go back to your instruction, and you will all commence right away testing the hearing of your pupils. I think it is well to give you a word of warning. Don't try to do too much. The organ of hearing is a very delicate one. If you put your mouth close to a deaf child's ear you may seriously injure the ear. If you make a loud noise or sound to test the hearing, keep them a little distance off. And so you must be specially careful in the use of a hearing-tube, because in a hearing-tube you condense the air very forcibly on the membrane of the ear. You should also speak softly into a hearing-tube. If you shout into it you may burst the membrane. In the case of a congenitally deaf child, where the membrane may be perfectly intact and the defect consists of some malformation of the inner or middle ear, you should be very careful, for the membrane is very thin, thinner than a piece of tissue paper, and if you condense the air into one of those hearing-tubes and shout you may burst the membrane. In using the hearing-tube, it is best to learn whether the membrane is ruptured or not. If the child has had scarlet fever it is almost certain to be injured; in cerebro-spinal meningitis it is not so certain, but when the membrane is ruptured a hearing-tube is of no use. The only thing you can do is to use the audiophone and springs to apply to the bony parts of the head. I feared that the discussion here, while it will undoubtedly do a great deal of good, might unintentionally do harm, and I thought a word of caution to you before you began to experiment on your pupils might be advisable.

[See elsewhere for discussion on "Ear-Trumpets."]

Vice-President Stainer took the chair and President Bell read a paper on "Line Writing, a Modification of Visible Speech."

Mrs. Gertrude Burton, of Washington, read a paper on "Experiments with Line Writing and Kindergarten."

Voted, that all papers not read before the convention, be placed in the hands of the Business Committee, with permission to print them according to their discretion.

Adjourned until 2 P. M.

Saturday, June 28, 2 P. M.

President Bell in the chair.

Miss Caroline A. Yale read a paper on "Some Elementary Language Exercises."

President Bell: The time draws near when we shall have to separate, and I am sure that no one will be more sorry than I to lose sight of all the bright and eager faces that I see before me. I hope that we may often have opportunities of meeting again. I like this convention. I think that it would do us good occasionally to have a convention of this kind. I think it would be a good plan when we adjourn to provide for a similar meeting at some future time.

We know not when we might like to have a little meeting of this kind. It seems to me that before we adjourn we might make a resolution to provide for such a desire on our part.

RESOLUTIONS.

The following resolutions were adopted :

WHEREAS, It may be advisable for the articulation teachers of America occasionally to assemble together in conventions like this, therefore

Resolved, That Prof. A. Graham Bell, Miss H. B. Rogers, Miss Sarah Fuller and Mr. D. Greenberger, be appointed a committee, to call the next convention of articulation teachers to meet at such time and such place as the committee may deem expedient.

Resolved, That the thanks of this convention are hereby tendered to the press of this city for the interest shown in our work by publishing the reports of the proceedings so fully in their daily columns.

Resolved, That thanks are hereby tendered to the railway officials who have contributed to the success of this convention by granting reduced fares to delegates, and that the names of the roads be incorporated in the minutes: Adirondack Railway, Baltimore & Ohio, Boston & Albany, Buffalo, New York & Philadelphia, Chicago & Atlantic, Chicago, Burlington & Quincy to Mississippi River points competitive with W., St. L. & P., Chicago, St. Louis & Pittsburg, Cincinnati, Indianapolis, St. Louis & Chicago, Cincinnati, Hamilton & Dayton, Cincinnati, Washington & Baltimore, Cleveland, Columbus, Cincinnati & Indianapolis, Cleveland & Marietta, Delaware, Lackawanna & Western, Detroit, Lansing & Northern, Fitchburg, Grand Rapids & Indiana, Indianapolis & St. Louis, Indiana, Bloomington & Western, Lake Erie & Western, Grand Trunk Railway of Canada, Lake Shore & Michigan Southern, Louisville & Nashville (Cincinnati to Louisville), Maine Central, Michigan Central, New York Central & Hudson River, New York, New Haven & Hartford, New York, Lake Erie & Western, New York, Pennsylvania & Ohio, New York, West Shore & Buffalo, Ohio & Mississippi, Ohio Southern, Pennsylvania Company, Pennsylvania R. R., Philadelphia, Wilmington & Baltimore, Pittsburg, Cincinnati & St. Louis, Scioto Valley, Toledo, Ann Arbor & Grand Trunk, Vandalia Line, Virginia, Tennessee & Georgia Air-Line, Wabash, St. Louis & Pacific, Wheeling & Lake Erie.

Resolved, That the thanks of this convention are hereby tendered to Mr. Dwight L. Elmen-dorf, the secretary, for the accurate and faithful discharge of the laborious and confining duties assigned to him.

Resolved, That the thanks of this convention are hereby tendered to its presiding officers for the ability, impartiality, and courtesy that have characterized the discharge of their duties.

Resolved, That this convention hereby expresses its appreciation of the generous hospitality extended to it during its sessions by the board of trustees of the N. Y. Institution for the Improved Instruction of Deaf-mutes, and especially for the considerate, untiring and unbounded attentions of the principal and teachers, aided by the matron and associate officers of the institution.

Mr. Greenberger: I think I but faintly express the sentiments of the board of trustees of this institution, as well as all my associates, and all the officers of this institution, if I say that we have been so highly honored by your accepting our invitation to hold your convention here, that we feel as if we were indebted to you for coming here, and that we ought to thank you instead of you thanking us. I myself have enjoyed it so much that if I were not afraid you would think me selfish and desirous of robbing others of pleasure, I would at once extend another invitation to this convention to hold its next session here.

Mr. Redfield, of Utica: I want to say a word. I want to thank the committee for having made their invitation broad enough, so that some of us have felt at liberty to come here who are not interested as teachers in any way, either of the deaf or otherwise, but to whom this subject is of very great interest because the matter has come into our own homes. And I want to say for myself, and, I am sure, speaking for others, that the deliberations of the convention and all papers read have been of great interest to us, have given us very great encouragement; and, although I presume you will often have words of encouragement spoken to you, I want, for one, to express my appreciation of the difficulties under which you labor, and I want to express the hope that you will continue this work of teaching speech to the deaf, with the knowledge that if you make that speech but very imperfect you are bringing to many homes a joy that you do not enjoy yourselves.

Prof. Gordon : I do not rise to offer a resolution, but I presume many here understand my personal relation to our work, though I fear that few understand how much my heart is interested in this special department ; and I wish that we may all—everyone who has engaged in any department whatever of this work,—we shall not lose sight entirely of what is behind us ; may press forward with a hope and faith and the confident belief that there is a great future for our work in America ; and in connection with that I would urge everyone who is particularly interested in this work—everyone who has taken part in the proceedings of this convention—to bear in mind that we have other conventions to which they are just as welcome as I have felt to this ; and that in the proceedings of those conventions we hope to have, as we sometimes have had in the past, important papers bearing upon many other branches of our work. Many of those papers and discussions upon language-teaching and upon discipline, upon all that goes to the education of our wards, will be of profit and of interest to everyone present ; and you can do a great deal of good by bringing your views to that convention. I hope to see you all again, and in that hope I will refrain from attempting to give my hand to each one of you here, because I expect to shake hands with almost all of you again.

President Bell : I am sure that we must all feel intense gratification that the results of this convention promise to be productive of so much good. I think we must all feel stimulated and encouraged by contact with one another, and I am sure that we shall go home with a deeper and firmer resolution to do what we can to give speech to the dumb and to teach the deaf to understand the speech of others. If there are no further remarks before the convention, the time has come when we must say good bye. A motion for adjournment is in order.

Upon motion of Mr. Binner, the convention adjourned *sine die*.

DWIGHT L. ELMENDORF,

Secretary of the Convention.

TRAINING OF ARTICULATION TEACHERS.

The Discussion and Resolutions Adopted.

Mr. Wines : I have written out some resolutions which I submit for the consideration of the convention. [For the resolutions offered by Mr. Wines and as amended by Mr. Greenberger, see end of discussion.] I do not know that it is necessary to make any extended remarks in relation to these resolutions. These are the thoughts that have sprung up in my mind as I have listened to the transactions of this convention, and I presume that there is no teacher of articulation present who will not agree to the general proposition that some sort of training in the direction I have indicated would be of very great advantage to articulation teachers in entering upon a work of so great difficulty as that in which they are engaged. I am not prepared to talk about the best form. I have submitted the resolutions, simply as they lay in my mind, to the judgment of this body.

President Bell : I am sure we must all thank Mr. Wines for the interest he has displayed in the subject of the promotion of articulation, and I shall call for remarks on that question.

Mr. Greenberger : I fully approve of the resolutions offered by our friend, Mr. Wines, and hope they will be adopted by this convention, and that the plan proposed therein will succeed. In seconding these resolutions, I would offer an amendment. [See end of discussion.] This does not conflict with what is already offered. If we can find benevolent friends who will aid such normal schools, very well. If we fail in that we may succeed in this. We may induce some if not all of the normal schools to introduce some of these branches. Some of them are at it already ; maybe more attention will be paid to them. At any rate, I don't think there will be any harm in adding this amendment.

President Bell : I think that this subject is the most important one that has been brought to our consideration. The success of articulation teaching in America will depend upon the teachers. Where are the teachers ? Our teachers are all fully engaged. Where are we to get more ? Where are we to get sufficient training ? I think that every member of this convention must feel the need of just such a training as is recommended in the resolutions of Mr. Wines and also in the amendment offered by Mr. Greenberger.

The question of the formation of a training school for teachers of the deaf is one that is exciting a great deal of attention. So far as it presents itself to my mind, I do not like isolation of teachers of the deaf from teachers of the hearing. I prefer the amendment of our friend, Mr. Greenberger. If — but it is an important if — if we could induce normal schools to give such a course of instruction as is described here it would be of great value. Articulation teachers are not confined to the deaf. We have hosts of persons with defective speech, defects that arise from ignorance of the mechanism of the vocal organs. We have hosts of children in our primary schools — children of Irish parents, of German

parents, of Italian parents — and there is serious danger of departing from the purity of the English language, if some steps are not taken to introduce articulation teaching into our primary schools. If it were feasible to have in our normal training schools of the country such a course as this, institutions and schools for the deaf would then have a large number of persons, trained articulation teachers, from whom selections could be made and to whom instruction could be given in those branches that relate specially to the education of the deaf. I am a little doubtful as to whether it is practicable to induce normal training schools to adopt such a curriculum ; in which case it seems to me that special training schools for articulation teachers of the deaf may be a necessity. I would rather avoid anything specially for the deaf. I would rather have it in conjunction with the hearing, if possible.

It seems to me that one feature of Mr. Wines's resolutions should commend itself — one special feature that I think has been omitted from Mr. Greenberger's amendment, namely, that we commend the subject to the wealthy and benevolent in the hope that they may perceive its importance and take advantage of the opportunity we offer to render a real service to the community. It has appeared to me possible that from the great interest that has been excited in articulation teaching throughout the whole country, and through the influence of this convention, that it may be possible to organize an association or society for the promotion of articulation teaching under the laws of some state with power to receive bequests, collect funds and apply them to the purpose of the promotion of articulation teaching. In which case such a society might, in some manner, lead to the formation of a special training school. I have given my views upon this subject. I am willing to endorse the vote of this convention, while I am not in favor, personally, of anything specially for the deaf apart from the hearing. I want to bring the deaf and the hearing together as much as possible. Still, whatever may be the vote of this convention upon these subjects, I myself will heartily endorse anything that will tend to help the teaching of articulation in America.

Mr. Greenberger : I did not mean to offer my recommendations as a substitute for these resolutions, but as an addition. Besides making every effort to establish a special normal school for the training of articulation teachers, I would also, in addition to that, recommend that an effort be made to induce as many of the normal schools and academies as possible to offer facilities for studying these branches. If we do not succeed in inducing them all, we may succeed in some cases. We can offer some inducements ; we can tell them : "If your teachers can be trained to take positions as articulation teachers in schools or in private families they can command good wages." I think some of the heads of these schools may accept the proposition. I endorse every word that is said in these resolutions, and I will vote for everything there whether my amendment be added to it or not.

Vice-President Stainer : As I have already had the privilege of being allowed to address you from the College at Ealing, and as this is a subject in connection with training, I feel it my duty as an associate of that college to stand here and say a few words. There is a common saying that "beggars must not be choosers." In this matter I feel that I am a beggar. I have begged others to train teachers for me simply because with 250 children, scattered over eight different centres of London, and with the supervision of the teachers in the School Board of London, together with the voluntary work that I have undertaken, it is impossible for me to train teachers as I want to for that work. It is true I can occasionally give them a lecture or instruction in classes, but I consider that the training a teacher

of the deaf ought to receive before she enters on to the work can only be attained at a college for such teachers. Now, we have in London two such colleges. The one that I have received the greatest amount of work from is the one that I represent, the College of Ealing, founded by Mr. Ackers. The other college is one in Fitzroy Square, founded by Mr. Wm. Van Praagh, who was well known there and in this country. Now I send teachers to both those institutions. They are very different in their nature. The one is a special college for training teachers and lays itself out for that special work. It has pupils of the educated classes on whom the students can obtain a certain amount of experience. The other training college in Fitzroy Square, although originally established as a college, developed itself more into a day school and has a number of pupils, I think 60 or 70; and, therefore, the principal of that college, I presume, is in a somewhat similar condition to myself. He takes my pupils and trains them, but he has a great deal of other work to do and, therefore, I have occasion to believe that the curriculum of one college differs from the other. Now the proposition before you is to establish a special college for training teachers, and I presume it is on the principle of the Ealing College that such a one as he has in his mind may be founded. Then, on the other hand, there have been remarks about a normal school. Well, in a normal school—that is, a school with 50, 60 or up to 100 children—teachers can be trained and have experience at the same time. It seems to me better calculated to train teachers than the special college that teaches them theory and small practice, having few pupils. I am only speaking for myself and am not wishing to direct your wishes in these two matters, only the experience that I have gained I will submit to you. The teachers that I want to my mind should be ready to take a class at once and teach that class with a visit and inspection from me. Each one of my teachers ought to be thoroughly qualified, and for that qualification a considerable amount of training, a considerable amount of lecturing and theory, and also a considerable amount of practice would be highly beneficial to render a teacher fit to attend one of my classes. Now the teachers, who get that experience, are very quickly snapped up. I have nominated and engaged half the teachers who have been already trained at Ealing, and this session I intend to add four or five more if I can get them, but they are very quickly taken up, especially by rich people who have deaf children. I have lost in that way four or five teachers in the last year. As director of these schools, I must have some means of having teachers trained. As to which direction it should go in I cannot give a decided opinion, as you see I use the two colleges of a somewhat different character. All I want is teachers that are thoroughly trained, ready to put into my school.

I think these remarks are justifiable, as I am inclined to think, since I have been here, that the tendency of the government in this country is toward the establishment of day schools. Now if day schools are established, of course some different principles would have to be adopted. My experience of ten years in the London day schools I offer to you for what it is worth.

President Bell: I would just add to the remarks that I have already made one thing that I think is of importance—one objection to the suggestion of a training college,—that is, that any training college specially for the deaf would lead to uniformity in our methods of teaching. I do not believe that uniformity is a good thing. I would rather see diversity; a healthy difference of opinion is what makes progress: the discussion and discovery of errors. From errors we advance, and by the discussion of our errors we improve. Now these subjects that are mentioned are prerequisites of teachers of articulation. Before they commence to study to teach the deaf they ought to know something about vocal

physiology—all that is known about sound. If we could have some place in this country—and there is not one at present—where these subjects could be studied, and where we could have a large number of young men and young women who have studied the mechanism of speech, then there might be added to that curriculum a special department of the deaf, so that we could select from the large number who have acquired a knowledge of physiology a small number of the best to be trained in the method of teaching the deaf, and then we could require of them practice by being sent into the different institutions.

Mr. Wines : I would like to explain my position a little. I don't want to take up the time of the convention. In the first place, I want it distinctly understood that in offering these resolutions I do not mean to express any preference for what is known as the articulate system of teaching deaf-mutes as compared with the method of teaching by gesture or by the sign-language. That is a subject that I do not mean to touch either in the resolutions or in any remarks I may have to offer, but I suppose from what I have heard said that all the teachers of the deaf are agreed that some deaf-mutes can be taught to articulate, and that the only question which is before us in this convention is how many of them can be taught to articulate, and what is the best method of accomplishing the result which we all have in view.

Now, when I listened to Prof. Porter's paper last night, although I count myself a reasonably intelligent and well-informed man, I felt that I was extremely ignorant. I was entirely beyond my depth. I did not know what he was talking about, and I wondered to myself whether there were not some here who were in the same condition as myself. I doubt whether even those who are teaching articulation could follow Prof. Porter's elaborate description of the mechanism of speech, or comprehend your [Prof. Bell's] own able, clear and forcible observations on that paper; and I said to myself, if I need instruction I suppose other people do, and if I were going to teach articulation I should feel that I should want to comprehend that subject. Then my mind reverted to these other subjects, and I said these ought to be taught to teachers, but how and where can they receive such instruction? My friend, Mr. Greenberger, thinks that they can be taught in ordinary normal schools. That may be, and if so I should be very glad indeed to see it done; but I have had a good deal of knowledge of normal schools. The normal schools of our State were under my supervision for a term of years, and I became very familiar with their whole working. I don't know about New York or any other State, but in the State of Illinois I am quite sure no attention would be paid to a resolution of that character. The schools are sustained by appropriations from the State treasury; they will pay the salaries of just so many teachers and no more; all the places are filled and there would be no more money available for these purposes, and the Legislature would not make any more appropriations for them; so that, as far as the State of Illinois is concerned, I don't think there is anything to be hoped for by introducing into the normal schools the teaching of vocal gymnastics, lip-reading, etc.

Another thought is that these teachers—and I cannot express the pleasure I feel in looking into the faces of these ladies, so intelligent, so earnest and so devoted—I feel that these ladies are devoted during the greater part of the year to teaching; they are doing it partly for love and partly for money; they are making their living out of it. They have not the time to leave their schools during the winter months and attend the normal schools, but if there were summer institutions, I think some of them would be glad to avail themselves of the opportunity, and I thought it not impossible that if this matter was brought to the attention of rich men who are anxious to improve the condition of the human

race, but who do not know what to do with their money — there are some who want to do something that has never been done before — and if one should find that he could distinguish himself by establishing a school of this character, there is a little element of vanity in human nature which would make this practical, I think. I sympathize with what Prof. Bell has said, that it is important to make as little distinction as possible between those who are deaf and those not deaf, and to bring them all into association one with the other ; and if it can be done through the normal schools I am perfectly willing, and I should be glad to have the experiment tried. I should feel out with one hand for the normal schools and with the other for the rich man. On this subject of making distinctions between the deaf and those who are able to hear, I want to make one general remark. I always feel when I come to a convention of deaf-mute instructors as if they did not want me there. I have no reason to think so on account of any personal treatment I have ever received from any superintendent or teacher, but I know there is a general feeling on the part of teachers that they wish their schools connected with the educational and not with the charitable institutions, and because I have the word "charity" stamped upon my back they don't like to see me around. The fact is, that I take an interest in that work, and I expect to continue to do so ; and I expect to continue whether you want me or not. My general observation on this subject among the paupers and criminal and deaf is that the same principle applies to all of them. If you want to treat an insane man properly you must treat him as if you forgot that he was insane. The same with the criminal. If you want to treat a pauper properly you must seem to forget that he is a pauper and act as if he was on a financial footing with yourself ; and if you want to treat a deaf-mute properly you must forget that he is a deaf-mute and treat him just the same as any other human being. I may say the same with regard to the ladies. You should forget that they are ladies and remember that they are human beings. If you want to treat men properly you must forget all that is individual and peculiar and specific that is connected with them, and remember only the common manhood which you have with them ; and the more fully you appreciate that you stand upon the same level of manhood the greater will be your success in dealing with man and with woman.

Mr. Greenberger : In connection with this subject, I should like to have some information from you, Mr. President, in regard to the school of vocal physiology in Boston. I should like to know the objects of that school, how it is supported, and how large a number is in attendance, what the students intend to do after they leave the school, etc. I understand that a good many of the students of that school become articulation teachers, and possibly another amendment to this amendment might be desirable. I should like to have some information on that.

President Bell : I am afraid I shall be unable to satisfy you on that point. A number of years ago the Boston University established in connection with its departments a school of oratory under the leadership of the late lamented Lewis B. Monroe, of Boston ; and every articulation teacher, whether a teacher of the deaf or a teacher of the hearing, should remember with gratitude the labors of Prof. Monroe. He established this school of oratory in connection with the Boston University for the study of just these subjects, — for the study of elocution, the study of the mechanism of the voice, the study of vocal physiology ; and from the pupils of that school were selected a class to have special instruction from me and from others regarding the special needs of the deaf ; and from that class were drawn many of the articulation teachers that we have present in this convention. But a few years ago an important event led to my withdrawal from the

active work of instruction in the School of Oratory—the invention of the speaking telephone. Another important event destroyed the School of Oratory—the death of Lewis B. Monroe. The special department for the instruction of teachers in the subject of Visible Speech was for some time carried on, and I rather think still is carried on, but not in connection with any school of oratory or in connection with the University, by my late colleague, Prof. Alonzo Butterfield. I hoped to have seen him here in this convention; but not having actually been engaged in the work myself for a number of years, I am really unable to give the condition of this school. If the School of Oratory were still in existence, you would have the very thing you want, but it is all dead.

The resolutions offered by Mr. Wines were as follows :

Resolved, That for the improvement of the condition of the deaf who are susceptible of instruction in spoken language, nothing is more essential than the establishment and maintenance of a training school for teachers of the deaf.

Resolved, That the curriculum of such a school should include the anatomy and physiology of the organs of speech and hearing; vocal gymnastics; speech-reading; the elementary laws of sound; the methods of testing and developing latent hearing, when it exists; English orthography and orthoëpy, in their special relation to the deaf; and the art of imparting a knowledge of articulate speech to the deaf and to the semi-deaf.

Resolved, That a school of instruction for teachers in articulation might be made partially self-sustaining, but that in order to secure for it permanence and the highest possible degree of usefulness, an endowment is essential.

Resolved, That we commend the subject to the wealthy and benevolent, in the hope that they may perceive its importance and take advantage of the opportunity here afforded to render a real service to humanity.

The amendment by Mr. Greenberger was as follows :

WHEREAS, A knowledge of these branches must prove of great usefulness to teachers of the common schools also, in enabling them to remove the defects which are quite frequently found in the utterance of the pupils of the common schools, therefore

Resolved, That normal schools, seminaries and all similar institutions of learning, the graduates of which intend to become teachers, be petitioned to offer facilities for the study of the above-named branches.

Resolved, That a committee of three, of which the president of this convention shall be a member, be requested to devise such means as, in their judgment, shall best secure the objects of these resolutions.

The resolutions as amended were adopted.

The following committee was appointed :

Rev. F. D. Wines, Mr. David Greenberger, Prof. A. Graham Bell.

THE DISCUSSION ON EAR-TRUMPETS.

Mr. Greenberger : Mr. President, I may state that in this instruction, we have been experimenting with all the ear-trumpets we could get hold of ; and I have found that while some will hear better with one, others will derive more benefit from the use of a different kind of an ear-trumpet. I have here a few specimens of trumpets.

[Mr. Greenberger exhibited a number of different kinds of ear-trumpets.]

Prof. Gordon : I regret to take even a minute of this valuable time, but in beginning these experiments in reference to teaching the hearing, some may be disappointed by the child's not recognizing the sound — not giving it at once ; and I trust you will not be discouraged by that fact. I have experimented a little where I ran over in my own mind some vowel sounds, and I put some numbers — 1, 2, 3, 4, 5 — on a slate, and I told them I should skip about on the numbers, and I wished them to repeat the number whenever I pointed to the sound. They could not do this ; but I think it was ten out of eleven or twelve who gave those sounds after half an hour's practice, although they could not repeat them at all ; probably they could afterward be taught what those were.

Mr. Binner : Has anyone here in the convention heard of a new appliance which is said to have been made or invented in Italy — an ear-trumpet, something which is said to be based upon the latest scientific principles ? I think Dr. Brücke, of Vienna, is in some way interested in it. A physician friend of mine in Milwaukee told me that he was going to Europe in a few weeks, and would take pains to find out all about it, and let me know.

Miss Rogers : I would like to ask Mr. Greenberger if he can tell which one of those ear-trumpets has seemed to help the largest number of children.

Mr. Greenberger : I do not think there is any one better than the rest.

Secretary Elmendorf : I would like to ask Mr. Greenberger if he does not think the long, flexible tube has proved more beneficial than anything else — I mean in all respects. I think, as far as I have been able to experiment, that the hearing capabilities are about on a par with all of them ; but I think the long tube is the best because you can apply it to the child's own talking.

Miss Worcester : Last year, about twice a week during the year, I tested the possibility of hearing of every child who came under my care. I found a number of instances in which children, who showed no power to imitate sound and who did not gain any during the course of my experiments, showed in one ear a great sensitiveness. It made me rather anxious at the time, and I want to ask whether, under those circumstances, one who experiments ignorantly ought to consider that it was a case for an aurist before going on with the experiments — whether there is not danger of doing harm to the child ?

Vice-President Stainer : I should be very much pleased to tell Miss Worcester what I have done in that direction. You all know that I have a large practice of children under my charge, and for whom I am responsible, not only in the schools but also in the homes. I speak more particularly about the homes ; those

children I feel responsible for. I have myself made some experiments and found that children with a very slight sound have been very much frightened; and, of course, it frightened me also; and lest I should make experiments to the detriment of these children, I have consulted with one of our best aurists, Mr. Lennox Browne, a very well-known aurist, and a man who has written books on the subject and who may be consulted with advantage in any cases of deafness. He has rendered me very great assistance in this respect in pointing me out cases where I might experiment without any danger, and having done so myself, I think I may venture to recommend such a course in any case where there is a fear. Mr. Lennox Browne has kindly allowed me to attach his name to the list of my honorary officers.

President Bell: I have noticed a number of cases similar to that mentioned by Miss Worcester. I have no experience to guide me as to what to do. The painful sense exhibited is an evidence that there is a sense of hearing, and I think I should be interested to know the results of careful experiments in such cases to develop the sense of hearing under the advice of an aurist. I don't think that in such cases you could do anything except by very gentle means. I would not have any shouting or anything of that kind. But there are facts which seem to indicate that the hearing may be developed. I will tell you an incident that in itself is very interesting. When, in 1872, I desired to have one or two pupils to experiment upon, I was very much interested in a little girl from Chicago, whose name I now forget—a congenital deaf-mute—and arrangements were made with her parents to send her to me for instruction in articulation, in Boston. She never made her appearance; but some months afterward I received a letter from her father explaining the cause. He said that shortly after he had been in Boston this little girl had experienced very painful sensations in her ear, and finally was taken with convulsions and was very ill, and the doctor, on being called in and observing the girl, expressed the opinion that the child could hear; that it was a sudden case of restoration of hearing. It was discovered that the convulsions or agitations occurred when a lumbering cart or omnibus would pass the door, and she was observed to watch with her eyes the persons who spoke in the room. The doctor gave it as his opinion that there was no real illness; that it was a case of the developing of hearing, and that, as she had never heard sounds before, it frightened her. The child was taken to the country, on the doctor's advice; and, in the course of three or four months, it was evident that she was learning to speak. So I lost my pupil, but she gained her hearing. I am sorry I don't remember the name, because it was one of the very few authentic cases of the recovering of hearing by a deaf-mute. When she came to me, she was about five or six years of age.

Secretary Elmdorf: I should like to mention a case that occurred in my class this last year. There was a boy who had been in this institution 8 or 9 years, when he tried the ear-trumpet. The resulting pains, when words were spoken into his ear in an ordinary tone of voice, lasted until the next day. Mr. Greenberger and myself were very much troubled, and the teachers were cautioned not to speak loud. This boy had a very heavy voice, and no matter what we would do, he would talk in a voice that was very disagreeable. Mr. Greenberger got an idea that the boy's voice could be trained by that ear-trumpet. He held the trumpet to the boy's ear and told him to speak into it. He did so and the boy jumped away. He became afraid of the trumpet, and it got so that when I wanted him to lower his voice, I would simply point out the trumpet, and he would speak in a low tone. He got the idea that his voice hurt hearing people

just as much as it did himself. He is gradually overcoming this harsh tone ; and in this way we have trained that boy to modulate his voice and speak in a soft, pleasant tone.

Vice-President Stainer : Just one word on this very interesting topic. I should like some record to be taken of a few of these special cases. A child was sent to me from New Zealand, and I had that child for some little time as an experiment. The child was feeble-minded, but its hearing was very acute. Its sense of hearing was so acute that the child could hear sounds that no one else could hear. Very often it would suddenly start, and those who were with it would imagine that there had been some sound made in the house. Very shortly afterward it would be found that something had happened in a row of houses near by : — that there had been a cat crying, or something of that kind. The sense of hearing was so acute that if you only whispered in the child's ear the pain would be very great.

Secretary Elmendorf : I will state that this boy, although I tried Prof. Gordon's idea of seeing whether he would recognize the same sound again, has never been able to get the sound of my voice through the ear-trumpet. I would ask him what it was I said with the trumpet, and he would say, " I don't know."

Mr. Greenberger : I would like to mention a very interesting case. Last Thursday morning I had a little German boy here on the platform. He came to us last September. He had been three years in an institution for deaf-mutes in Germany. He was reported to me to be totally deaf, and I considered him so for some time. When I tested him with the ear-trumpet, I found that his ear was very sensitive. It was very painful to him, and his voice was even harsher and more disagreeable than the boy Mr. Elmendorf mentioned. I tried to cure him of this harsh voice in the same way, by practicing persistently with this flexible ear-trumpet. He finally developed hearing enough, so that I might carry on conversation in an ordinary tone of voice behind his back. I considered him totally deaf. His mother thought he was totally deaf, and the teachers of the school where he was three years in Germany considered him totally deaf ; but, by using the trumpet in this way, he developed hearing in such a degree that now he hears the ordinary voice. It is strange that those two boys, the one that Mr. Elmendorf mentioned and the one that I mentioned with the loudest and most disagreeable voice in the school—it is strange that both of them should have such sensitive hearing. There may be some connection. A good many deaf people speak in a very low voice, and there are others who will shout at you.

PRESIDENT'S ADDRESS.

A. GRAHAM BELL,
WASHINGTON, D. C.

It is a noble cause in which we are engaged, and it is gratifying to see the interest that is manifested by the large gathering in the work of giving, as it were, speech to the dumb and hearing to the deaf. We have delegates from all parts of this country. We are honored by the presence of the Rev. Mr. Stainer, a delegate from the London (Eng.) School Board, who has crossed the Atlantic to be present with us on this occasion, and to give us the benefit of his counsels as a teacher of over forty years' experience, and who has come here to see what we are doing, what we have been doing, and what we hope to do for the instruction of the deaf.

Few people have any conception of the prevalence of deafness in this country. A few days ago I looked over one of the circulars of information of the National Bureau of Education on the causes of deafness, and I met with this statement, that not more than five persons out of every hundred in our population have unimpaired hearing! Such a statement as that at first sight seems almost incredible. Ninety-five per cent. of the total population of the country are presumed in this circular to have hearing impaired in a greater or less degree. Dr. Sexton, who made an examination of the hearing of 570 pupils in the public schools of New York, reported that thirteen per cent. of the children he examined had the hearing power of one or both ears affected. If such statements as these are to be relied upon, how is it that we meet with comparatively few persons that are deaf? I think that the explanation will be found in the fact that we do not call a person deaf unless the infirmity affects both ears. A person may lose the hearing of one ear entirely and not be termed deaf. It is only when the hearing of both ears is affected that we call the person even hard of hearing.

Now, I direct your attention to a very curious fact in regard to those persons who are hard of hearing. They are very numerous in the country. There is hardly a man or woman in this assembly who has not one or more friends deaf, or hard of hearing. The curious fact that I would direct your attention to is this: these friends of yours, who are hard of hearing, are nearly all adults. Where are the little children that are hard of hearing? Has anyone seen a child with an ear-tube or trumpet? If not, why not? Is deafness of this character confined to adults? Is it a mark of advancing old age? Where are the children who are deaf? Now comes a curious point: we find no children who are deaf except those we term deaf-mutes. Deafness in childhood seems to produce dumbness. A child of five or six years of age, who can talk as well as you or I, becomes deaf from scarlet fever, or from cerebro-spinal meningitis, and after a little while his speech becomes imperfect, and finally vanishes—he becomes a deaf-mute. A child, who is born deaf, never naturally articulates. A strange fallacy has arisen in the public mind that dumbness is due to some defect in the

vocal organs. No such defect exists. I have myself examined the vocal organs of over 400 deaf-mutes, without discovering any other peculiarities than are to be found in the population at large. In Germany, all the deaf-mutes, so-called, are taught to speak, and in Italy, nearly all. In Germany, all are taught to understand the utterances of their friends by watching the movements of the vocal organs. There is no reason in nature why the perfect mouths of the deaf children of this country may not be educated to produce as perfect sounds as the mouths of other people. There are difficulties in the way: it is our duty to overcome those difficulties. It is for us to devise means whereby we can make more perfect the artificial speech that we teach our pupils. Already through your efforts we have nearly 2,000 deaf-mutes in our schools and institutions, who are being taught to speak, but there are more than 4,000 for whom no efforts are being made. I take these statements from the recent report of the Clarke Institution for the Deaf and Dumb.

The majority of the deaf and dumb in the United States are not yet taught to speak. In Europe the case is different. It is well known to all who are here, that in the majority of our schools and institutions articulation is taught. In some of our schools, articulation and speech-reading are used as the means of communication between teachers and pupils. In other of our institutions, though articulation is taught, it is taught as an accomplishment, and the general education of the pupils (and the medium of communication is an artificial medium) is either by a manual alphabet, or by writing, or by signs. I find from the *American Annals of the Deaf and Dumb* — the official organ of teachers of the deaf and dumb of this country — that in 1882 there were 48 institutions and schools in the country, in which articulation was not used as a means of communication, but in which articulation was taught to a few of the pupils, and there were only thirteen schools in which articulation and speech-reading formed the medium of communication between the pupils. The 48 institutions contained 7,000 pupils, and the thirteen oral schools contained 734. But if we examine the case in Europe it is very different. Out of 338 institutions outside of this country, no less than 226 are oral schools, containing 12,512 pupils, all of whom are taught to speak and to understand the speech of others by watching the movements of the mouth; while only in 75 institutions, containing a little under 5,000 pupils, are articulation and speech-reading not used as a means of communication. It is, therefore, evident that we have a great deal to do in this country. The vast majority of the deaf children of Europe are taught to speak, and why should not we teach ours?

It may be interesting to recall the fact that at the commencement of this century, there was no school for deaf children in the whole of the United States. It was in the year 1817 that the first institution, or American Asylum at Hartford, Conn., was opened. At that time, people had so little idea of the numbers of deaf and dumb, that it was thought that one school would be enough for the deaf children of the whole country. So this institution was opened under the direct patronage of Congress, as a school at which we were to collect the deaf children of the United States. But it was soon seen that one school could not accommodate the pupils that made their appearance, so that different State governments took action, and in different States institutions were established under the control of the boards of State charities, in which the deaf-mutes of the State were to be collected.

The American Asylum in Hartford was the first national school, and as new centres of instruction sprang up, the teachers of the American Asylum naturally became the first principals of the State institutions. But the State institutions

and the national institutions have proved insufficient to accommodate the numbers of deaf children that require education, and of late years there has been a tendency for the boards of education of the cities to take action, and city schools — day schools — have sprung up in the large centres of population, and there is every indication that such schools will increase very rapidly. In these schools, children live at home and attend school simply for the purposes of education. But, in addition to the national schools, the State institutions and the city schools, a number of smaller schools due to private interest have been established in this country, so that to-day in the United States we have 58 institutions or schools for the education of the deaf, containing a little more than 7,000 pupils. But this is not enough to meet the requirements. As has been stated by the Rev. Mr. Wines, the United States census of 1880 has startled us with the information that nearly as many pupils as there are in nearly all our institutions and private schools put together, are growing up without any education whatever, and immediate action has to be taken in order to accommodate these little ones.

One great difficulty which arises is : where are you going to get teachers ? Our teachers are busily employed. Our articulation teachers have more work than they can do. I myself have had applications from institutions and from private families for articulation teachers. I cannot find articulation teachers disengaged. There is every indication that immediate provision must be made for the education of a large mass of deaf children who are growing up in our midst in ignorance.

In regard to this convention, I think that its chief objects are two in number. First, the improvement of the methods of teaching speech to the deaf, so that we may get better speech, — that they may speak better, may understand better. Second, the devising of means to promote the cause of articulation, so that we shall have a larger percentage of deaf children taught to speak and to understand the speech of others. Plans will be proposed for this purpose. One of the plans that will be proposed for the advancement of the methods of teaching speech, will be to effect a permanent organization of the workers in this field. I believe that it will be proposed in this convention, that the convention of American instructors that will meet in the course of two weeks, shall form a subsection of articulation, so that the teachers of articulation may meet together, and discuss and improve their methods of teaching speech to the deaf. I throw this out now as a suggestion that you may all think of it. It may come up later in the course of the convention. That is one course that may be pursued for improving our methods of teaching speech to the deaf.

In regard to the promotion of the cause of articulation and the increase in the percentage of our pupils, who will be taught to speak and to understand the speech of others, I understand that it will be proposed in this convention that an organization shall be effected of the friends of the deaf ; that a national association of persons interested in articulation and speech-reading and in the promotion of the cause, be formed with power to collect funds, and that the money so collected shall be expended in various ways in promoting the cause of articulation, especially in the dissemination of information among the parents of deaf children, that they may learn the glorious news that their children can be taught to speak ; that they may learn the names of the institutions and the schools in the country, where they may go and verify the statements that are made.

I also throw this out simply as a suggestion that you may all think over these matters. They will probably come up in due course in the proceedings of the convention.

Vice-President Rev. Wm. Stainer's Address.

Brothers and Sisters and Friends: A few letters have been read from absentees, and I am somewhat disappointed in not hearing more from the United Kingdom; which you have done me the honor to place me on this platform, I presume, to represent. I feel that my only title to this honor lies in my being a humble teacher of the deaf. As the only representative of the United Kingdom present, then, I am disappointed in not hearing read more letters from other fellow-workers with myself. I am sure it must be an unintentional oversight. I have, by word of mouth, been asked to give expression to the hearty feelings of coöperation which we feel in England, and especially from Mr. Ackers, the founder of our college at Ealing, of which I have the privilege of being an associate; Mr. Van Praagh, and other workers in the cause. Dr. Buxton, for instance, I believe, is very well known in this part of the world. His heart is always with us; he has the pen of a ready writer, and is always able and willing to help.

You have done me the honor to make me your vice-president, and I can only say that I will endeavor to perform what little duty may be required of me to the best of my ability. Perhaps some of you know that I have been a teacher from childhood. I began to teach forty years ago. I have always been a teacher of articulation. For seven years, I may say, I taught nothing else but the sounds of the English language to deaf children. It is true that the manual alphabet and the signs were occasionally used in the institution where I spent my early years. When I got through with that institution, I endeavored to adopt a system more like the German system, which, at that time, I was fully acquainted with, dispensing with motions and using speech alone, and, in numerous instances, I was successful. I was encouraged by that to take steps to establish an infant school, which was rather a hobby with me at that time, five and twenty years ago,—to have an infant school where the children could be taught very young, and I am still impressed with the importance of that point—so much so that I hope, in a very short time, to make efforts in London, as I did in London and Manchester from 1859 to 1866, to organize a primary or infant school, because I can see that to teach children speech, who are deaf, is a much more difficult task than it is to teach hearing children. Hearing children begin to speak from their infancy. It is very well to say that it is easier to begin at a later age. I grant all that; but, my friends, I hope you will agree with me that the more difficult our task the more we ought to desire it, and the more credit we shall gain, and the more satisfaction to ourselves. If it is any more difficult to teach a child of four than a child of ten, I don't consider the question, but which will benefit that child most, teaching it from the age of four years or from the age of ten. It is our duty to do the best we can for our pupils. If a child is brought to me, as they commonly now are every week, fresh cases, and I am asked what I can do for that child, and I hesitate, knowing the difficulty there is in teaching such a child—perhaps it is a little weak in intellect; perhaps not altogether as bright as I should like to see all children—yet I say to myself, I should like to see this child taught to speak, and I tell the friends of the family so, and in doing that I say to myself: If that child can be taught to speak, it is my duty to teach it. Every child that is dumb, or wants hearing, can be taught to speak, and ought to be taught to speak.

An American System of Teaching Articulation to Deaf-Mutes.

D. GREENBERGER,

PRINCIPAL OF THE INSTITUTION FOR THE IMPROVED INSTRUCTION OF
DEAF-MUTES, NEW YORK CITY.

The method of teaching articulation and lip-reading to deaf-mutes is usually called the German method. It did not originate in Germany, nor was it invented by a native of that country, yet the Germans well deserve the honor of its being named after them, because they were the first to introduce it in their schools for the deaf, and have done more to develop it and bring it into general use than any other nation. I yield to none in my admiration of that system, and of the results which the German teachers have accomplished. Nevertheless I have come to the conclusion that the oral method as practised in Germany may be found well adapted for the schools of Holland, Switzerland, Austria, and all other European countries, but it will never answer to the requirements of the oral schools of America. The considerations that led me to this conclusion are the following :

It is a well-known fact that the sons of English husbandmen, for instance, hardly ever rise above the condition of their fathers, and it is almost unheard of that the son of a peasant of continental Europe ever becomes anything but a peasant. The children of the great majority of the middle and lower classes of European nations go to school till they are twelve or thirteen years old, then the boys are put to work in the fields or shops, and those of the girls who do not share a similar fate but are allowed to remain at home and help their mothers in the kitchen, etc., may consider themselves very lucky indeed. The education, which these children are expected to get in the common schools, must needs be very rudimentary. But in this great republic, where we have no peasantry and no pauper labor, and where education is more general among the people than in any European country, our public schools are expected to afford facilities to their pupils for acquiring an education, which in Europe can be acquired only in higher institutions of learning. Since here, as well as there, the object of institutions for the deaf must be made to conform with that of the common schools for hearing children, an American system of educating deaf-mutes, by means of articulation and lip-reading, must be as distinct from the German method, as the American system of signs is from the French method. Besides learning to speak and read the lips, our pupils must acquire a good command of the English language, and a thorough knowledge of all the branches that hearing children study in the common and high schools. If all American instructors of the deaf will use their best efforts in this behalf, I do not doubt in the least, that in due time we shall have a uniform American system which will enable us to do all that is required of us and do it well.

I shall now give you an outline of the plan which lately has been adopted in this institution and by which we *try* to solve the problems before us.*

1. The German process of beginning by teaching the mute to give the powers of the letters of the alphabet was discarded. We commence with simple words like *papa, mama, toe, eye, pie, tea, shoe, no, etc.* The hearing child does not acquire control of his vocal organs and learn to speak by practising on blows and hisses like *p, f, s, sh, etc.*, but tries at once to say such words as I have just mentioned; and our little mutes, too, find less difficulty in pronouncing the word *papa*, for instance, as a whole, than to give each of the elements of this word separately.

2. The German plan of teaching articulation, lip-reading and writing simultaneously, is not practised here any longer for the following reason: The hearing child does not learn to write until years after he has learned to *speak* and *think* in spoken language. Since our pupils do not completely master the language of their country till they have learned to *think* in it, it seems indispensably necessary that spoken words should be made the direct and only representatives of ideas from the very beginning, and that writing should be treated as a secondary mode only of expressing thought. If I could fully carry out my ideas, I should not begin to teach my pupils to write till they have learned to speak so well as to be able to express themselves on ordinary topics as readily as hearing children do, when they enter school. By such a course we could not fail to accomplish the most important object of our method, viz.: to teach the pupil to think in spoken language. But it would be too difficult for parents and the general public to see the propriety of having a child go to school three or four years, before he begins to learn to read and write. I, therefore, adopted a plan by which some Italian articulation teachers try to compromise the matter and teach writing at first as a mechanical art only in special lessons, not showing the connection between spoken and written words until the former have been thoroughly mastered. In all the lower classes of this institution, the pupils learn a new word or phrase through lip-reading only, and are not taught how to write it till days and sometimes weeks afterward, when they use it correctly and thereby give evidence that they have thoroughly understood it. This process is persistently followed out in teaching words that hearing persons are apt to learn through the ear, but not with technical terms or such expressions as are usually acquired from books by anybody.

3. By using the word-method in teaching reading or writing, we obviate all the difficulties which deaf articulators experience on account of the irregularities of English spelling, if other methods are followed. In order to teach the pupil how to read the word *edge*, for instance, we do not call to his attention that this word is composed of four letters, *e-d-g-e*, and that it would be more sensible if it were spelled with two only, viz.: *e-j*; but we present this word to him as a whole and make him conceive and remember it as such. If a child lost its hearing after it has learned to speak, the vocabulary, which it has on entering school, even if this vocabulary consist of a few words only that are but half intelligible, is used as the foundation upon which the structure of spoken language is made to rest. The word-method and the natural system of teaching language are admirably adapted to enable such children to retain their speech and natural voices.

* I hope you will notice that I have taken particular pains to emphasize the word "try" in the last sentence, and not do me the injustice of thinking for one moment that I intend to give the impression that we *have* solved the problem of devising such a national system as seems to be required.

If the German method is used, these children have to spend weeks and sometimes months in learning how to give the sounds of the letters of the alphabet. Before this articulation drill is over, they usually have forgotten any words that they could say on entering school, and the naturalness of their voices has become irretrievably lost.

4. Every available means is used to develop the hearing of the semi-deaf. I find that those who come under this head usually are able to distinguish certain sounds of speech through the ear, but fail to recognize others. They usually can say a few words on entering school, but speak these imperfectly only, because they do not learn to imitate those of the elementary sounds that they cannot hear. Therefore, they do not acquire language through the ear, and have to be taught to speak by means of lip-reading like totally deaf children. But after they have become familiar with spoken words, they can learn to recognize them through the ear. For if they distinguish only some of the elements of a word, they supply the rest from the context and thus understand the whole of it.

5. I do not place books into the hands of beginners, because if they study language from books, it is apt to become a dead language with them. They seem to know it by sight only, as it were, but hardly ever get on "speaking terms" with it. If it is to become a living tongue with them as it is with us, it seems necessary that we should make our method conform to the natural course by which we acquired it, instead of attempting to teach from books. After three or four years, when the pupils have become sufficiently advanced in the use of speech, we introduce, first, an ordinary school reader, then a simple book on geography, history, etc., so that, in due time, we give instruction in all the branches that are taught in common and high schools. That deaf-mutes can acquire a knowledge of these branches, by means of verbal teaching, is sufficiently proved by the fact that some of the graduates of the oral institutions of this country are as well educated when they leave school as young people of the same age who can hear.

THE DISCUSSION.

Vice-President Stainer: As Mr. Greenberger's paper will, perhaps, be the most important offered before this meeting, I take the opportunity of asking permission to make a few remarks upon it.

Mr. Greenberger calls his system "an American system." I am sure you will agree with me that no man, more than an Englishman, would desire that the name of his country should be attached to that system. As an Englishman, I should like to see him adopting the English system, and I am not alone in that. The Italians have done a very great deal in teaching the system — in fact, I believe, have worked out in a new direction altogether; and, in my humble opinion, from what I saw in 1880, when it was my pleasure to attend the International Congress, I came to the conclusion that the Italians had worked out for themselves a more perfect system than any that obtains in Germany at the present time. Therefore, they have the right to be jealous of the term "German," and to call theirs "the Italian system." You will see, therefore, that I agree with Mr. Greenberger, that the system taught here should be called "an American system," and I, as an Englishman, should like to call the mixed system that I have adopted, "the English system." But, perhaps, Mr. Greenberger will excuse me if I make a remark which I think necessary to correct an impression which may obtain. Mr. Greenberger does not mean to say that he is not pursuing the

German system, any more than the Italians mean that they are not pursuing the German system, or that I am not pursuing the German system. I am quite sure that Miss Rogers and Miss Fuller will admit that they are pursuing the German system.

What do we mean by the German system? We use it advisedly only to point out the difference between the two methods of teaching—one oral, by speech; and the other manual, by gestures and signs. The term, German system, is only used in contradistinction to the French system, the one oral and the other manual.

Mr. Greenberger has told us that he no longer teaches the powers of the letters, but teaches syllables. Now, I must say I was very much struck with Mr. Greenberger's method. This is the first institution that I know of that begins by teaching syllables instead of sounds. What we have used up to the present time, in England, has been a system by which we commence by teaching the pupil the elements of sound, and I must say that it is very difficult to apply the system, that I am now using myself, to very young children. We must wait until their powers of imitation are sufficiently developed to enable them to comprehend the minute distinctions between *p* and *b*, *t* and *d*, *s* and *z*. From my remarks last night, I suppose you gather that I am in favor of teaching children at a very early age. I think, from what I have learned in this noble country, that I will modify my system and teach the very young, syllables instead of sounds. I think that will be one improvement upon our elaborate, scientific system of teaching, first of all, the elements.

As regards lip-reading and writing not being taught simultaneously, on which Mr. Greenberger remarked, that, I think, we must pursue. When we take a child that has the power of making strokes on a slate, I think it is very desirable that the child should be taught to associate some sound with each character. It has been shown that a simple mark may be made to represent a certain sound. I should suggest letting the child first make the sound and then teach it to mark, and then if the child can make the mark from the sound, it is lip-reading, because the child is not supposed to read the sound. I think, therefore, that lip-reading and writing should go hand-in-hand, and on that point I differ from Mr. Greenberger.

Mr. Greenberger has made some very important remarks as regards the semi-deaf. It is very true in some of our English institutions—and I am sorry to say, perhaps, in some of my classes—that the semi-deaf-mute is put down with the other classes to begin from the commencement, but we all have to make experiments.

Mr. Greenberger: Our States are liberal and allow us to keep our pupils long enough to give them a liberal education, and give us the means of buying school-books and whatever is necessary. We are, then, able to give them a better education, and the people expect us to do so; and, therefore, we cannot accept any foreign method. We must have an American system. We can keep our children from 6 years of age to 22 years of age. From 6 to 12 the county pays for them.

Mr. Dudley, President of the Clarke Institution: If we simply talk about the oral system and the sign language system, we understand each other. I don't know what an American system can be. Some institutions have signs as the basis of instruction and method. Others have the pure oral system. Now, has anybody the right to select one of them and call it "the American system?"

Even in the articulating schools of this country, there is no uniformity. I don't think we can go into the business of christening systems here.

Mr. Gillett : I hope, Mr. President, that we shall discuss here the different methods of teaching articulation. I understand that the sign-methods are not before the convention.

Prof. Gordon : There is one point in our friend's paper which pleased me very much. That is his suggestion to begin with words rather than with the elements. Those of us who have taught articulation know how difficult it is to begin and run over our forty odd elements and combine them into words, and succeed in lip-reading. Many years ago, I was struck with this fact, that here and there all over the country, I could find different persons who read the lips well. Perhaps those who are very familiar with the *Annals* will recollect a statement by me that lip-reading is a matter of genius. I have changed my mind on that subject after considerable study. I found that those who have the genius for lip-reading, take it up by reading syllables and words instead of elements.

Mr. Ely : I want to ask whether Mr. Greenberger means to begin by using words only ; whether he is not constantly brought back, in that process, to the exercise of the pupils in the elements themselves, and whether those who commence with the elements, do not really go very quickly to the use of words and make the application ? Won't it practically work back to pretty nearly the same thing ?

Mr. Greenberger : I have practiced a pure German system — the oral method as practiced in Germany — fully 20 years ago, before I gave it up for the other. This new plan I have had in use now for three years, and I find that I can teach a child to say the word *papa* in one-tenth the time that I can make him give the power of the letter *p*. It seems as if nature had paved the way for us. There are any number of little words which a child will learn to pronounce in that way. In teaching them by means of the sound-method, sounds combine better. Formerly, I had an idea those whom we call semi-deaf — the hard of hearing — could not hear an ordinary tone of voice, but that if we spoke loud enough, they would understand anything. For instance, you take the word *boy* or *father*, I thought that if a child could not hear when I spoke them in a low voice, he could understand them if I spoke them loud enough, but I find now that the trouble is entirely different. Of those children, who are hard of hearing, some would hear all the vowels, some of them would hear all the consonants, and others of them would hear some of the consonants, and that is the trouble why they do not learn to speak. It don't matter how loud you speak the word *water* into their ears, they only hear *ater*, they don't hear the *vo*. The Rev. William Stainer suggested this to me. He experimented with his pupils, saying *too*, *po*, *foo*, etc., but they only heard the *oo*.

Dr. Bache, of Philadelphia : It is a well-known fact that there are certain sounds that can be very readily heard by persons who are deaf, and there are other sounds that they cannot hear. This is, no doubt, owing to some malformation of the ear, just as you all know that there are some persons who cannot distinguish all colors. It is the same with the ear. Another point : syllables not only have sounds which are very different from letters, but sentences have sounds. As the best illustration of that, I may tell you what the Frenchman once said : " Why is it that all the Englishmen and Americans say, — ' Tattle too, tattle too ? ' " The explanation was that these people had said, " That will

do." Now, how many of us speak that plainly? I have noticed, in going my rounds, that many of the teachers grimace much more than persons should do in expressing themselves in ordinary conversation. That may be very well in the beginning; but, afterward, I think that they should speak more rapidly.

President Bell: I have listened, with very great interest, to Mr. Greenberger's paper. For many years past, I have not been a practical teacher myself, but I have given close thought to the subject of teaching articulation and speech-reading, and I have developed ideas, that will be presented in a paper further on, which are, in some respects, remarkably like Mr. Greenberger's; but they go further than he does. He commences with simple words, I commence with complete sentences. I think that we should bring the method of teaching deaf children to speak as nearly as possible to correspond to the methods of teaching ordinary children to speak. Does a mother commence by giving elementary sounds or syllables to her hearing child? No, she gabbles complete sentences, and the child listens. He does not speak at first, he listens, and when he commences to imitate, he does not speak in sentences, he imitates in words. He does not say, "Please give me a glass of water?" He says "water" and "bread;" and he does not speak perfectly. He speaks imperfectly. But, by degrees, the articulation is improved. I will not take up your time with enlarging upon this idea at the present time, but will simply say that I have been pleased with Mr. Greenberger's suggestion of commencing with words, but I don't coincide with him in his omission of writing. I think that which is clearly visible, we can rely most upon in the education of those who are dependent upon their eyes and the sense of touch. I believe in writing as a very great assistance, and as a necessity in the case of those who are congenitally deaf. In the case of those who could speak before they became deaf, for those who are termed semi-mutes, I see no reason whatever to doubt that Mr. Greenberger's plan might be the best. They know the language, but the deaf child, who is born deaf and has to gain all his ideas of articulation from his teacher, must have the language presented to the senses that he possesses in a clearly visible form. I cannot agree with Mr. Greenberger on that point.

Mr. Greenberger: There is not the slightest difference between your ideas and mine, Mr. President. There is simply a misunderstanding. If you had been present this morning when a few of my pupils were here, you would have seen what I meant. With the semi-mutes, I think writing is best. There is not enough to be gained by spending hours in trying to make a pupil understand a word from my lips when I can write it down in a second.

A Few Thoughts on Several of the Topics for Consideration.

MISS EMMA GARRETT,

SCRANTON ORAL SCHOOL FOR THE DEAF, SCRANTON, PA.

First Steps in Articulation Teaching.

Some hold that in teaching a deaf child to speak, we should teach consonants and vowels separately by what is called the single element method. Afterward, consonants and vowels are combined into syllables and words. It seems to me, it is best to commence with the syllable. By using syllable or word first I think we insure a smoother speech.

If we teach the sound of *p* and then *a*, and afterward combine them, the deaf child is, I think, more apt to give us *p-u-a* than if we give it the syllable at first. Hearing children's first efforts at speech are syllables — *pa, pa, da, da, na, na*.

Some teachers who disapprove of the single element method go so far as to say that children should be taught only words from the first; others, who do not favor the single element method, would have their pupils go through a very elaborate syllabic drill, much of which would represent meaningless syllables; keeping their pupils on this mechanical drill a long time, and rather discouraging any efforts to talk till the ability to give all the sounds perfectly be acquired.

With my present light, I incline to the view that neither of these extreme positions is best; but good teachers rise above imperfections in methods, and good results have been shown by both.

It seems to me, the first thing we should ask a deaf child to articulate would be the name of some object of interest to it, showing the object while it was making the effort. I think the child should not see the names of objects in *writing* till it can make a fair attempt at the articulation of these names. But I think it should be encouraged to use every word it has been taught, even if its first efforts to articulate it are imperfect.

We do not look for *perfect* speech in the hearing child's first words and sentences. We should constantly correct the "baby talk" of the deaf child, who, not hearing correct speech, is entirely dependent upon our corrections to improve its speech.

At this early stage, I think a brief syllabic drill is good, alternating with the drill on words to which we attach meaning. The syllables that hearing infants repeat are often meaningless. The deaf child will not usually begin its education before six or seven years old; a hearing child will learn to speak much earlier. From the fact of the deaf child's organs of speech being more or less inactive till he enters school, they are not so flexible as the hearing child's; and in giving words and sentences to it, you let the child stop using its vocal organs while you explain the easy words and sentences. Whereas, a syllabic drill very

quickly given — say all the consonants with the Italian *a*, or some other vowel — will, it seems to me, prepare the child for the rapid sequence of words in speech.

In this syllabic drill, consonants can be given sometimes initial and sometimes terminal; excepting in the case of short vowels. When the short vowels are taught, I find it easier to teach with the consonant terminal, or both initial and terminal. It is easier to teach a deaf child *at* or *pat* than *pa*. As the child advances, some syllabic drill of several consonants with a vowel can be given in change with words and sentences. I should devote much more time to the teaching of words with their meaning than I should give to this syllabic drill, but I should not ignore the latter.

It seems to me unnatural to separate mental progress and articulation, or to feel that either can be even temporarily neglected. To my mind, the two cannot be satisfactorily separated; I think it desirable that both should go on from the first. With young hearing children we expect them to gain knowledge by asking questions with their imperfect speech. So, I think, we should give deaf children speech as skilfully and as rapidly as we can, encouraging them to constantly use it, and we as constantly correcting it when incorrect. If we should keep a child who had difficulty in articulating *cat*, on that word for a long time with a view to perfecting it, I think it would tend to weary and discourage the child. I should give it the names of other things connected with the object; meanwhile making a mental note that the child found difficulty in articulating *cat*, and going back to the word as frequently as my judgment dictated. Or another way that seems to me good, would be to occasionally give it some other word in which the *k*-sound occurs with some other vowel or diphthong — perhaps the word *cow*; supposing the *k*-sound was the stumbling-block in the way of his articulating *cat*. If the difficulty appeared to be with *t*, I should occasionally try to work up that sound in a different combination, perhaps trying *too*. That being the name of one of the parts of the body, the child would naturally be interested, and would, therefore, be apt to try to follow your directions. When all the sounds occurring in *cat* had been obtained in different syllables or words, we should probably find on going back to *cat* that it would present less difficulties to the child.

Articulation teachers know that it is much easier for some children to give certain consonantal sounds with certain vowels than with others. Also that certain sounds that are difficult for some deaf children are easy for others. I have usually found it more satisfactory to let a deaf child feel the sounds under and against my lower lip, rather than at the throat and chest, except in developing the sound of *g* hard.

In endeavoring to develop speech-sounds from our pupils, I think we should guard against "mouthing" — a fault into which articulation teachers are apt to fall. I think we should make speech-sounds well forward in the mouth; endeavor to have a clear-cut articulation and give vowels their proper quality and quantity. It would be well for persons who are not articulation teachers to aim for this. I remember hearing the late Prof. Lewis B. Monroe, of the Boston University School of Oratory, tell his students that "everyone should aim to speak so distinctly that he could be understood by the deaf."

We need to guard against dwelling too long on words. If we think how many words we utter in a minute, we can realize that deaf children should be taught to speak as rapidly as is consistent with their not slurring any sound in the words they are speaking. Our pupils should be taught to keep their tongues well forward in giving front vowels: long *e*, short *i*, long *a*, short *e*, and short *a*.

In endeavoring to cultivate a distinct articulation, without distortion, we should guard against letting our faces remain impassive. Let there be as much and as fine facial expression as possible among teachers of the deaf. If we want our pupils to understand the meaning of happiness, I think we should aid our explanation by letting our whole countenances beam with it ; and so, in explaining other feelings, it will help the meaning of what we are explaining immensely if we will *look* the meaning in our faces.

Voice-Training.

This is a subject of great interest to all articulation teachers. The want of hearing in our pupils will always interfere with perfect modulation of voice. But a teacher who is skilled in developing difficult speech-sounds ; who has a quick ear to detect imperfect vowel quality ; who knows how to tell the child to shape its mouth to get correct vowel quality, and who knows the proper length of time that should be given to the sounding of the different vowels, will probably send out pupils whose voices will not be disagreeable. Sometimes a simple direction to a child to lower its voice will help a voice that is pitched too high, and vice versa. Without much thought, study and practice a teacher will not be likely to gain the skill above referred to.

The Rev. Phillips Brooks said he believed in the good elocutionist as he did in Halley's comet — which comes in sight of this earth once in about seventy-six years. The success of the oral method depends so much upon our having *skilled articulation teachers* that we must bend all our energies to perfect ourselves for our work and keep them from being as rare as Mr. Brooks thinks good elocutionists are. The more skill a teacher possesses in overcoming the many peculiar difficulties that the deaf have in acquiring speech, the less fatigued that teacher appears to be by the work, which I suppose, would hold good in any sort of teaching.

Speech-Reading.

The developing of speech-reading, or lip-reading as it is commonly called (and not, I think, without some reason, as a certain impress is left on the lips in giving almost all the sounds even where the lips do not take an active part in their formation), is an important part of an articulation teacher's work. It is often developed in a comparatively short time by those among the deaf who have lost hearing after acquiring speech and who retain more or less speech. With the deaf born, and those among the deaf who have lost hearing in early infancy, it is a slower process.

With the first-named class there are various ways of beginning. A favorite way of mine is to approach the child and talk to it in a lively, rapid manner ; and if I see it does not understand, ignore this temporarily and proceed as though I expected it to understand, telling it that it would now learn to understand what people say by watching the mouth. Then I open an easy reading book and read a short sentence, asking child to repeat it. He will probably gaze at me without making any reply ; then I repeat it and quickly show the sentence in the book to the child. I again repeat it, directing the child's attention to my mouth. This time it will probably see one or two words on my mouth. This will serve to give the idea to the child that it is to try and recognize the words in the book on my mouth. If it only sees a very few in the first lesson it will have encouraged him, and that is what we want to do in the beginning.

Children, who have lost hearing after they have acquired speech, are, I think,

naturally more sad than those who are born deaf or who have lost hearing in infancy, because the latter do not fully realize what they are deprived of. Therefore, it seems to me right to take the quickest way of letting them know that there is a possibility of their again being brought into communication with hearing people. If I were teaching an older pupil of this class, who could readily understand a written explanation of speech-reading, I can see no objection to giving him such an explanation before proceeding to the actual work. *After* proceeding to the "actual work," I object to resorting to much writing. With old and young pupils of this class, I advocate addressing them in rapid speech. Indeed, while instructing them, I should purposely resort to rather more rapid speech than I should use to hearing people; hoping that if they read very rapid speech from my mouth they would read speech of ordinary rapidity from the mouths of strangers who might not in all cases speak distinctly.

After once giving these children an idea that they can be restored to intercourse with us, I should devise means to make their speech-reading as true as possible. A simple drill of the consonants with the different vowels will be beneficial. I have seen very true lip-reading developed from this; children articulating words that were entirely new to them and which they could not get from the context. Deaf pupils of this class will very soon find out that many words look somewhat alike on the lips. Certain consonants look similar, and certain vowels resemble each other; but, I think, the eye of the deaf can be trained to be sufficiently acute to judge which you are giving even when unaided by the context. For example, some think the eye of the deaf cannot be trained to distinguish between the words *tight*, *died* and *nine* except by the context, because the tongue is in very much the same position for these words; but if the *sound* of these words is so different, the organs of speech must perform a slightly different action in their formation, and with very careful training, I think, the deaf can recognize this difference, even, as I said, without the context. But they will usually have the context and will not often be put to such a severe test.

I gather from Prof. Bell's interesting article on "Fallacies Concerning the Deaf," that he would favor the preparation of a book of words that resemble each other—"homophenes" as they have been called; and placing this book in the hands of the pupil. I think with many pupils it would be well to do so, in connection with the careful eye-training to which I have alluded, and I hope such a book will be prepared. With others, I think, we should bring the words gradually to their notice, as the occasion seemed to demand; if they said *bay* or *day* from my mouth when I was saying *may*, I should tell them I had not said *pay* but *may*; then, after showing them the slight difference that exists between these words, I should write the words *may*, *bay* and *pay* on the slate and direct their notice to them as a group of words that resemble each other on the mouth.

While it is our duty as articulation teachers to study every means of making our pupils' speech-reading as true as possible, the fact remains that, even if the deaf are obliged to ask you to repeat occasionally, and even after repetition fail to see all that you say, the power to understand much of what is said by their fellow-beings greatly lightens their heavy burden.

The teaching of speech-reading to the deaf born, and to those who have lost hearing before acquiring speech, is a more difficult matter; but their speech-reading can be, I believe, made very true. This class having no knowledge of language, many think that they must get this knowledge before they can acquire speech-reading satisfactorily.

It seems to me, it is best to carry speech-reading, articulation and language on together; not separating them in anyway. I think we should talk to deaf-born

pupils, all the while, in the same manner that we should to a hearing child, using the same language, except that the same things would have to be gone over much oftener, as the deaf child, for a certain period, gains principally from his teacher, while the hearing child has many teachers ; he hears different people constantly say the same things to him.

While developing the deaf child's mind, its imperfect articulation should, I think, be constantly corrected. If this is the teacher's habit, interruptions of this sort will, it seems to me, be rather looked for by the pupils and, therefore, being expected, will cease to be a very serious interruption to any idea that the child may be gaining. So, I should say : — Correct faulty articulation in season and out of season, so to speak. The child will not like the interruption, and will, therefore, naturally try to be more careful, and as time goes on, the increased carefulness on the part of the child will render corrections less frequent.

Classification of the Deaf in Regard to Articulation Teaching.

I have made the following classification of the deaf in the Oral Branch of the Pennsylvania Institution : Those who have lost hearing after acquiring speech have been placed by themselves ; those who have some appreciation of sound — some more and some less — form another class ; and the deaf-born pupils and those who have lost hearing in early infancy are placed together. It seems to me that it is not well to put a pupil, who has talked before becoming deaf and who retains natural speech, with a child who never talked and to whom artificial speech must be given. Neither, I think, should a child, with some perception of sound, be taught with a totally deaf child, if it can be avoided, as they need such different treatment ; it now being known that the imperfect hearing of this class is frequently capable of improvement.

Difficulties Experienced by Deaf Articulators on Account of the Irregularities of English Spelling.

Being in sympathy with the spelling reformers, I think a good paper might be written on the " Difficulties Experienced by Hearing Children on Account of the Irregularities of English Spelling." I once heard a good linguist say that she felt like giving thanks every day of her life that she was born to the English tongue, considering it such a difficult language to acquire. How frequently we read letters containing misspelled words from hearing people who are oftentimes well informed on many subjects. Bearing this fact in mind, I should say : " Speed the good work of the spelling reformers for both hearing and deaf children." The dictionary-marks are helpful in indicating pronunciation. Children are puzzled on finding that the letter *a*, indicated by one name in the alphabet, has so many sounds and the dictionary-marks for sounds of letters seem to be a relief to them ; they find that there is a limit to the different sounds of the vowels and that they can learn them. We should, I think, guard against letting the deaf become so dependent upon the dictionary-marks that they could easier give the sound of long *e* marked on the slate, than to take long *e* from our mouths.

Articulation as a Means of Instruction.

Holding the views that I do in reference to articulation as a means of instruction, it was necessary for me to say something on this subject in the thoughts that I have given on several of the other topics. I will merely add that I believe it to be practicable to instruct the deaf through speech, if the teacher is ever on the alert to give the child simple words and sentences, as the occasion

for their use comes up. In this way the child gains a vocabulary of easy words from which the quick-witted teacher can build, explaining difficult things by means of the simple language first acquired.

Prerequisites of a Teacher of Articulation.

Tact, patience and an animated manner are some of the prerequisites of a teacher of articulation. A good English education, a knowledge of the mechanism of speech, and a correct ear are necessary. All who are truly interested in the welfare of the deaf would like to have teachers possessing *all* the cardinal virtues. If the best men and women are needed for the education of the hearing, surely they are doubly needed for the education of the deaf. When we think how the deaf child turns to its teacher for nearly everything in the beginning of its education, we can realize the great responsibility resting upon us.

It may be said of this teaching, as some one has said of another sort of teaching, — training for the profession is necessary, but *fitness is a prerequisite*.

SPEECH-READING.

MISS ALICE C. JENNINGS,
AUBURNDALE, MASS.

To many of the deaf, speech-reading has become a valuable acquirement. By its aid language is mapped out before them. Through the motion of another's lips, every variety of thought may be conveyed to their minds.

Speech-reading, however, like articulation, is not without its difficulties. To a few, it is perfectly easy under given circumstances, but hard under others; to many, it proves difficult at all times. "It is the hardest study I ever heard of," remarked one pupil. "Greek would be nothing to it, and I had rather take Chinese, and consider it a pastime." The removal of these difficulties is a problem that may profitably engage the attention of teachers.

Judging from what the pupils themselves say, the fundamental obstacle to success in speech-reading, is the wide variety in facial formation and manner of speaking, presented by different persons. The pupil above referred to, says: "If all had mouths exactly alike, and spoke in precisely the same manner, there would be no trouble. But as it is, one has to begin over again with every new acquaintance." While mouths differ as greatly as faces, this difficulty cannot be wholly removed. But if certain definite rules were formed and practiced by all teachers of speech-reading, the obstacles to success might be lessened. On both sides, there is something to be learned. Not only must the pupil learn to understand, but the teacher must learn to *be* understood. When the work proves unsuccessful, the teacher should be willing to consider whether he may not himself be in fault, rather than his pupil.

In order to render speech-reading easier for their scholars, teachers should aim, first of all, to *speak naturally*. This may be considered a strange rule, for a peculiar manner of speaking is usually thought necessary in addressing the deaf. To speak slowly and carefully is always admissible, and, in some cases, absolutely essential; but this is quite consistent with perfect naturalness in appearance and expression. Here, as always, teachers should be as *human* as possible. As they turn from their pupils to address a hearing person, those pupils should not be allowed to see any change, except in the rapidity of utterance. Much of the sensitiveness felt by the deaf vanishes when they find themselves addressed in a perfectly natural manner. If, when in the school-room, they are accustomed to a simple, easy mode of speech in their instructors, they will, on going out into the world, find far less difficulty in understanding people generally.

In the next place, a *distinct enunciation* is of great importance. Every word and element must be clearly and correctly uttered. To attain this, teachers themselves need to practice articulation. So many words are similar to each other that the points of difference ought to be carefully noted. When the formation of the element admits, the teeth should be separated and the tongue seen, or the lip-reader will be wholly at fault. The rule, "Never talk with teeth

closed," cannot be too strongly emphasized here. In no case is it a good plan ; but, in addressing the deaf, one might as well not talk at all, as allow that curtain of ivory to shut out all the movements behind it.

One deaf lady, who has practiced speech-reading the greater part of her life, was lately much discouraged because she could not understand a person with whom she lived in daily intercourse. On inquiry, it was found that this person had prominent teeth, and generally kept them closed when speaking. There was the secret ! In many cases, it will be found, as in this, that the person speaking, and not the speech-reader, is the one to blame.

The third rule is involved in the one last spoken of. Without a *free use of the lips*, it is hardly possible to enunciate distinctly. The lips must be brought together in forming the labials, *p*, *b*, and *m*, and kept in suitable position when other elements are given. I have frequently been puzzled because a person, having a prominent mouth, did not appear to make the labials at all, and I was continually mistaking these elements for others.

Another difficulty is found in the similarity of elements. One deaf lady is in constant despair at her own stupidity in not understanding the difference between words expressing such opposite qualities as *thick* and *thin*. The sole variation in these words lies in the final element, which, being rapid and scarcely visible, is hard for the eye to detect. In such cases, would it not be possible to secure a more marked distinction ?

Suppose, for instance, that in pronouncing *thin*, the tongue be kept in the position for *n* an instant or two after the word is uttered. If the mouth be opened sufficiently to make the tongue visible, a decided difference will be noticed between *n* and *k*. In *p* and *b* also, the position might, in the case of *b*, be held a little longer, and the pressure slightly increased. Other distinctions will readily suggest themselves. Such prolongation of elements might be incorrect and unpleasant in ordinary speech, but seems admissible in the present case.

When a word is not understood, it will often be found helpful to *spell* it, letter by letter, or element by element. Intelligent pupils will frequently, in such a case, guess a word before it is half finished. This plan, of course, presupposes a pupil familiar with all the elements. With beginners, it is less helpful.

This leads to the sixth point, viz. : the *use of words intelligible to the pupil*. It is useless to expect him to read words he does not understand ; and, therefore, due regard should be had to the extent of his vocabulary. Generally speaking, it is better, in talking to the deaf, to use the shortest and simplest words possible. Short words are always easier to read than long ones.

In speech-reading, as in most other things, allowance should be made for the *personal equation* — the peculiarities of the individual. No two of the eight or ten speech-readers, whom I have consulted, give prominence to exactly the same thing. One says she can understand best when a person talks rapidly ; another requires the utmost slowness of enunciation. One can read the lips of a particular person with ease ; another fails entirely to understand that person. One can only read the lips of people speaking directly to her ; another frequently understands persons who, ignorant of her deafness, address her clearly and naturally in a public place.

To meet cases so varied, requires no small amount of patience, perseverance and power of adaptation. Yet, if teachers will note the special difficulties of each pupil, and apply a remedy to these, the general work may be helped forward in a very marked way.

The eighth point refers to the expression of the face and eyes, which ought to correspond, as far as possible, with the sentiment uttered. A friend who has employed speech-reading for more than one-half her life, says that she depends

greatly upon the expression of the eyes. We all know how much an intelligent, expressive countenance deepens the force of the words uttered. With a deaf speech-reader, the place of those vocal inflections, which cannot be heard, is supplied by the expression of the speaker's countenance. We ought to guard as much against a never-altered expression as we should against a monotonous tone in speaking.

A natural, distinct enunciation ; a free use of the lips ; carefully marked distinctions between similar elements ; the spelling of words not readily understood ; the use of simple language ; the study of individual peculiarities ; the cultivation of correct facial expression — all these, it appears to me, are of great importance in making speech-reading successful.

Teachers of articulation have special training, — why, as teachers of lip-reading, do they not need the same ? In so far as instructors give to their pupils power to understand speech, do they brighten the lives and widen the horizon of many beside those directly under their care.

The Aural System for the Semi-Deaf.

J. A. GILLESPIE, B. D.,

PRINCIPAL OF THE NEBRASKA INSTITUTE FOR THE DEAF AND DUMB, OMAHA.

What I have to say in this paper, I have already said in an article in the *Annals*, from which I will read, inserting an account of certain tests and experiments which have been made since the article was written.

That a large percentage of our deaf and dumb pupils, so called, have partial hearing is a fact well understood. That but little effort is made to develop this latent hearing is a fact equally as patent. To prove that this dormant hearing can be developed, cultivated, and used in the education of this class is the object of this paper; and in it I shall give a condensed history of my experiments in this direction, and the conclusions deduced.

From my earliest connection with deaf-mute instruction, it has been a favorite theory with me that this latent sense might be developed, but not until four years ago did I make any special experiments to verify it.

About that time my attention was directed to the audiphone as an aid to hearing. I secured a number of these instruments, selected a class consisting mostly of grown pupils, those having some hearing, and drilled it daily from half an hour to an hour at a time for about three months, beginning with single vowel sounds, made in quite a loud voice. At the expiration of that time these pupils were able to recognize sounds, words, and a number of sentences across the room; and, frequently, I stood in the hall, leaving the door slightly ajar, and spoke sentences which they heard and repeated. These children did not recognize sounds, as such, at the beginning of this drill. What they heard were noises, wholly unintelligible. The hearing which they possessed, but which had been in a dormant state up to this time, became active by this drill, and they became conscious of a sense, or a partial sense, of which they were not before cognizant as being useful to them.

This experiment satisfied me, that, in the case of these children, the hearing could be developed, or, at all events, training would enable them to use what they had. The improvement was noticed both when the instruments were used and when they were not, thus showing plainly that there was development in the hearing.

Two years ago, I organized a class of the youngest semi-deaf children to see what would be the result of a similar course of drill. The progress of this class was even more rapid than the former. During the time of this training, the class was brought before the piano, and by daily practice the children learned to keep time to music. When the performer changed the time, the children would soon notice and change the step. They could accomplish this with their backs to the instrument equally as well as when facing it. They could distinguish more sounds, more words and sentences at the end of three months than the former,

both with and without the instruments. This test was in every way satisfactory and encouraging.

These experiments confirmed me in the belief that semi-deaf children could be educated through the medium of the hearing, if the right methods were employed and if taken young. With this idea in view, I submitted the matter to our State Board, who, being familiar with the work done, readily gave consent to proceed, and I at once organized such a class. This consisted of the members of the latter, above spoken of, and the new pupils entering school in the fall of 1882.

The method of procedure was the same as in the experimental work above described. Single sounds were given, at first, by the teacher in a loud tone of voice, beginning with the vowels. When the children were able to distinguish between two sounds, as *e* and *o*, a point was gained. (This, of course, refers to those having no previous drill.) From this primary work to words and sentences, progress was made as rapidly as the pupil could advance. The manual alphabet and sign-language were not used, at least rarely, in the work. Instruction was given orally. Object-lessons, pictures, action-work, and general public-school methods were applied.

At the close of the school year, these children had accomplished all that could be expected of any class of equal ability, taught by the general methods practiced in our institutions. They had a vocabulary from two hundred to five hundred words, which they could recognize by the hearing and speak fairly well, and use in language exercises with facility.

Last fall, 1883, two classes were started on this plan, one consisting of the remaining members of the class of 1882, (four having left the state, one to change his residence, and three of the brightest to continue the work in a private school upon this system,) and the new pupils who had some hearing; also those who gave evidence, at first, of ability to become good articulators and lip-readers.

The other class consists of members of the school from the first class down, who possess some hearing. One is a young man who graduated two years ago, and who was a member of the first experimental class four years ago. Conscious of his loss, he desired to return and receive the benefits of this aural instruction.

Right here I will introduce a few experiments of a later date. In our examination work, I kept a record of three of the brightest of the children in the Institute, of twenty words addressed to the hearing, twenty sentences addressed to the hearing, twenty questions addressed to the hearing, and twenty sentences to lip-reading. The first boy has a straight 10. This boy was in school in the Iowa Institution, I think, two years. Part of the time in the Iowa school he was in an articulation class. Lip-reading was practiced. As I understand it, no attention was given particularly to the hearing. He manifested none when he came to us. I wrote to his teacher, to make the inquiry as to what she had done with reference to cultivating his hearing. She said that the latter part of the year she thought there was some improvement in his hearing; she did not have the time to devote to it. I wrote to his mother and inquired what she knew of his hearing and speech. She said that prior to the time he came to the Iowa school, he could not speak a word, and she did not pretend to make him hear, to say anything to him through his ear. These examinations were taken from their school-year work. This boy, I spoke of, had as many as seven or eight hundred words that he had learned by sound. Of course, he knew the language and the meaning of the words before. No. 2 is a young man who left our school two years ago. Of twenty words hearing, he has a 10 minus. Of the twenty sentences, he has a 10 minus, which means that he missed not a full sentence,

but some part of one sentence. In twenty sentences, he has a 10 minus. Of the twenty sentences in lip-reading, he has 9½. The third case is a young lady about fourteen years of age, who had never been in school at all until about the middle of the term. She had hearing, but did not know how to use it. Her name is Gertie, and her mother would say, "Gertie, home?" Well, she understood that to mean, "Gertie, do you want to come home?" Or, she would say, "Gertie, go barn;" or something of that kind. And Gertie would understand that. But as to putting together words to form a sentence, she had not any idea whatever. She was able in this same work, though her sentences were of an easier kind than the others, from the fact that we had to give to her the meaning of the sentences and words. In her twenty words, sentences, and questions she was perfect, and she could have answered within her own vocabulary as many as you had a mind to ask.

Vice-President Stainer : That was one year's education ?

Mr. Gillespie : Yes, sir. We have in the whole school, under this instruction, seventeen. These three that I have taken are the best ones, and they range down to where the benefits are very little. Of these seventeen, four are congenital, and six deaf from sickness.

The latter class, beginning as it did with single sounds in the fall, is now taking sentences from the teacher's voice with ease. The teacher is obliged to speak in a louder than conversational voice, though not nearly so loud as at first. The hearing improves. The children are delighted with their progress, and are anxious to learn. The teachers are enthusiastic ; and while the work is laborious and often discouraging, they work with a strong faith in the system.

As to what takes place in a scientific point of view — whether the auditory nerve develops as a muscle develops, by use, or whether this is simply an education of the partial hearing, or both — I do not here discuss. This much I will say, however, that the sense of hearing, which has lain dormant and useless up to this time, is now sufficiently developed to be of great benefit to these children, and nobody is more conscious of it than they themselves. They know that heretofore they heard not, and that now they do hear. They know, also, that it has not been miraculously done, but that it has been brought about by patient, hard work on the part of their teachers and themselves.

I have no fault to find with those of the profession who regard the manual and sign-methods as the best, nor with those who consider the oral system as the only one to be tolerated, nor yet with those who find the audiphone and other aids to hearing as utterly useless. I take the broad ground that a teacher of the deaf is in a grand work, and is entitled to his opinion and his preference of method and appliance.

My experience and observation, in reference to this question, lead me to this opinion, that a large majority of the semi-deaf children in our schools *can and ought to be graduated as hard-of-hearing speaking people instead of deaf-mutes, as heretofore.*

The class of hard-of-hearing speaking people in society is large, but a hard-of-hearing speaking child, or one using an artificial aid to hearing, is a rare sight. And the reason for this may be found in this fact, that when a child is "too deaf to be educated in the public schools," he is reported as a deaf-mute and sent to an institution for the deaf and dumb, educated as a mute, and at the end of his course, to all intents and purposes, *is* a deaf-mute.

The question now is : Is there a remedy for this state of affairs? My opinion is that there is a remedy, and that it is found in what I will call the aural system.

If, by any process of training, this class of children can be taught the English language aurally and orally, they can take their places in society as speaking people, though hard of hearing. That this can be accomplished, that they can be taught the language by sound, admits of no question in my mind. The experiments here recorded amount to more than mere tests. They are demonstrations as far as this class of children in this school is concerned, and they number about fifteen per cent. of the whole. What can be done in one place can be done in another. That we have a greater percentage of semi-deaf here than elsewhere, I have no reason to believe. Some of these were not known to us to have hearing until tested. That as great a proportion will be found in every school in the country, I have no cause whatever to doubt. If this is found to be the case, and we consider the total number educated in the schools of the United States alone, over twenty-three thousand, and of the number who will be educated, the question assumes gigantic proportions, and is worthy of the best thought and attention which can be given it, and at once.

These semi-deaf children are in our schools to-day, and will continue to come until other provision is made for them. They do not hear enough to be educated in the public schools; they have too much hearing to be lost by being instructed with those who have no hearing.

Schools intermediate between the public schools and schools for the deaf and dumb should be organized. My plan for them would be the establishment of aural and oral branches in connection with our present institutions and under their management, but separate from them, where it is at all practicable. In institutions where this is not possible, the next best plan would be aural departments in the buildings, where all instruction should be aural and oral, or at least approximately so.

Of course the semi-deaf children in the institutions, oral schools excepted, understand the sign and manual system. This knowledge will be of advantage to them in their early aural work, but the sooner they are made to rely on hearing and lip-reading, the more rapid will be their progress. As to the methods to be pursued in this system of teaching I have only this to say: If any artificial aids to speech and hearing are found beneficial, use them — Bell's Visible-Speech symbols, Rhode's audiphone, ear-trumpets, anything, everything that will in any way contribute to the end in view. We use the above-named aids, and receive benefit from them. An apparatus by which the pupil can hear his own voice will, no doubt, be found useful in the future developments of the work. I have long been interested in this feature of our general work, and have had faith to believe that it would develop, and it affords me no little gratification to see that it is coming to the front, and is developing into a system of instruction, and that so many of the best minds in the profession are investigating it. It is only in its infancy. That the future has great developments in store in this direction, is my firm belief. It is not an easy system; it requires hard and patient work, but the results are an ample compensation.

I am not a hobbyist, but I have taken a very deep interest in this question. If what I have said be true in other places, as it is in this, it demands immediate attention, and we need not wait for times and places to come, for it is just as good a time now as it ever will be.

THE DISCUSSION.

Dr. E. M. Gallaudet: It gives me great pleasure to hear a few words in re-

gard to this new departure, if it may be so termed, in the education of the deaf. I had the pleasure of visiting the Nebraska Institute, in the month of February last, and spent some time in the room devoted to the instruction of the aural class, and I cannot express too strongly my interest in the method pursued and my gratification at the results obtained. I there noticed the pupils of the class arranged in a manner that struck me as very interesting and proper. The one who stood nearest the teacher, was the one whose hearing was the least in amount; the one who stood farthest away was the one who had the best hearing. The teacher spoke to them in a voice sufficiently loud to be heard by all the pupils. Of course, if the one nearest to her had been placed at the most distant point, the loudness of her voice would not have been sufficient; but, as it was, her voice reached all ears. The result was surprising to me; for I had not supposed so much had been done at the Institute in Nebraska. Pains were taken in all instances, that there should not be reading from the lips, but that the words of the teacher should be given and received by the pupils only as sounds. The children heard these words, and did not depend upon lip-reading. I heard a number of questions asked and answered. I asked some myself, and was answered readily and easily by these pupils, who, but a little while before, were so deaf as not to be classed at all as hearing people. But, as I examined them, they were hearing people; they were not deaf-mutes in any sense; they were rescued from the mass of deaf-mutes.

I would like, in bearing this testimony, and in giving this very hearty commendation to the aural instruction of the deaf, to emphasize a single point that should be borne in mind by those who undertake to engage in this feature of instruction, and by the general public who hear of this new departure. Nothing is easier in the enthusiasm of a convert than to draw conclusions too widely, to carry the possibilities too far. You will remember that Prof. Gillespie spoke of fifteen per cent. of the whole number of deaf-mutes as being capable of receiving aural instruction. We should be careful, therefore, not to convey to the public the idea, that it is to be expected that by some process, recently discovered, all the deaf are to be taught on the aural method. Of course, the giving out to the world of any such statement would only lead to disappointment. We are to bear carefully in mind that this new departure represents a percentage expressed, perhaps, by fifteen—fifteen out of every hundred of the whole mass of deaf-mutes; so we are to recognize a new classification of the deaf, and a new method of instructing a certain proportion of the deaf.

This differentiation of conditions and classes of the deaf is, as all teachers of the deaf know, important at many other points. We do not attempt to treat the whole mass of the deaf as though they were a class. I say a class in one sense. In the eye of the law, perhaps they are a class; in the sense of receiving benevolent assistance, they are a class; but there are differences in them which must be recognized, if we are to do them the greatest amount of good. In this case, the pupils to be benefited by aural instruction are fifteen per cent. of the whole number.

I would like to add a word as to another institution. In the Columbia Institution, at Washington, in the primary department, instruction in speech has been given during the last six years. I will not undertake to say what success has been reached in that department, but I will speak of one pupil who, six years ago, was entirely dumb; who had no speech whatever. In commencing his instruction in speech, the simplest elements were made use of at the beginning. His instruction in speech went on by means of lip-reading only for four and a half

years. He was an unpromising pupil for the first year and a half. At the end of the first year, he begged, with tears in his eyes, that the effort to make him speak might be given up, and his teacher was in doubt lest she should be compelled to give him up. But, she decided to continue, and went on with increasing success. By the end of the fourth year of his instruction, he had come to be able to speak very well, to read from the lips with great readiness, to understand conversation readily with his friends at home and with strangers, and, really, to converse easily within a very considerable range of space. About a year and a half ago, it was discovered that he possessed a degree of hearing with which it was thought best to experiment. That degree of hearing had not been previously supposed to be sufficient to enable him to understand spoken words. He heard loud shouts and noises, but did not recognize spoken words at all — knew nothing of the meaning of articulate sounds. But, about a year and a half ago, his teacher began some definite experiments in teaching him through the ear. She made use of a hearing-tube, and, to some extent, the audiphone — but very little — when it was found that he began to be able to recognize articulate sounds; and that instruction was persisted in, while his other instruction in the development of lip-reading and speech was continued. He is now found to be able to understand a great deal of conversation through a hearing-tube, such as is used by hundreds and thousands of people who are merely hard of hearing. It was my pleasure to present this boy at a meeting of the Academy of Sciences, held at Washington a few weeks ago, and to show to the Academy some results of this aural teaching.

Just to give you an idea of what the boy can understand, I asked him, through the tube, "How long have you had this tube?" He replied immediately, "About six weeks." "Would you like to sell it?" His face flushed. "No, sir." "Why not?" "Because I can hear with it, and I want to hear and speak." I asked then, "Do you mean to be a deaf-mute?" "I am no longer a deaf-mute," he said.

This conversation went on just as I have given it to you, and his understanding of spoken language is now as complete as this little incident would indicate. So that I join with Mr. Gillespie in believing that there certainly are many pupils with whom we can reach a result that shall enable us to say, that we have lifted out of the mass of deaf-mutes a large proportion who can actually — not by any sentimental paraphrase — be said to be no longer deaf-mutes, but they become simply hard-of-hearing people; and for such a result, I am sure we will all work heartily and harmoniously.

Prof. Gordon: Our friend Mr. Gillespie deserves great credit for his discovery of the practicability of aural training for many of the deaf. Perhaps it will be an encouragement to take a very brief retrospective glance, to show what has been attempted in other lands in this direction. The earliest accounts of extensive aural experiments go back to 1779, when it is said that De l'Epée and Pereira asserted that very nearly one-half of the pupils that went through their hands had some degree of hearing. They did not push the experiments, to ascertain to what extent they had hearing. Shortly after, in 1802, Dr. Beyer made some interesting experiments in Paris, and came to the conclusion that the hearing of many of the pupils could be very much improved. Dr. Itard, the famous aural surgeon of the Paris Institution, made a long series of experiments, some of them very severe, looking to the development of the hearing, through medicinal appliances. His experiments were not very satisfactory, but he was so well satis-

fied with the possibility of instructing many deaf-mutes through the hearing, that in his will he left a sum of money for the express purpose of teaching deaf-mutes without recourse to signs, his idea being that many of them could be taught through the ear ; a class was organized in compliance with the conditions of the will, and that class is in existence in the Paris Institution to this day.

Following Itard, came Dr. Deleau, Jr., who made some very interesting experiments, and who presented to the French Academy thirteen pupil-patients who had obtained hearing through medicinal appliances. It was said that these thirteen were not able at first to understand words when they heard them. Hearing was given to them, and they then had to be taught to recognize the meaning of what they heard, and, by degrees, to reproduce the sounds, and thus speech was ultimately given to those thirteen. Deleau received a valuable prize from the French government, through the Academy, for his grand achievement.

About 1836, Fabriana, of Modena, made an examination of his pupils, and he concluded that about one-half of the so-called deaf and dumb were not entirely deaf. He did not depend upon aural surgery or medicine, but developed the hearing of his pupils by what may be called auditory gymnastics, which improved their hearing very much.

Following these, was the very famous Dr. Blanchet, of Paris. Dr. Blanchet used medicinal means to a very slight degree, and educational appliances to a very large degree, and he met with considerable success. He invented and made use of apparatus to test the various properties of sound—that is, to ascertain what degree of sound as to intensity, quality, pitch, etc., could be responded to by deaf-mutes ; and he followed that up by making a number of experiments, using many sorts of musical instruments for the purpose of training the hearing ; and he claimed that he had made considerable progress, that he had succeeded in developing, training and improving the hearing of a few pupils entrusted to his care, for that purpose, to a very considerable degree ; and he presented the results of his efforts to the French Academy of Medicine. This led to a long and exciting discussion of ten days in April, May and June, 1853, in the Academy, covering the field of deaf-mute education, but wandering far from the points the Academy had undertaken to consider. Unfortunately, the doctor aroused bitter enmities and rivalries, and his principal opponent, a man of high position, who seemed to have the advantage of him in many respects, succeeded in crushing him, and the experiments in France, in training the hearing of the deaf, ceased with Dr. Blanchet. But, so far as experiments were made, they were of a very gratifying character. It was found that there were some in every school, who had enough hearing to receive some instruction through the ear ; and the conclusion of those who have looked into this matter, was that special efforts should be made to instruct them in that way ; and I am very glad that our friend, Mr. Gillespie, has taken up this work as an original experiment in America, and by methods of his own devising ; I am gratified at the success he has met with, and I am a little sorry that he has “ not made a hobby of it,” because I think it very well deserves being a hobby which all of us should ride.

Mr. Gillespie : Dr. Gallaudet spoke in reference to the impression that might get out that fifteen per cent. of the deaf and dumb, so-called, were to be restored to hearing.

Dr. Gallaudet : That they all were.

Mr. Gillespie : That they all were. I was very careful to say that it was not

fifteen per cent. I said that a majority of the semi-deaf in the schools could be graduated as hard-of-hearing speaking people. I placed the number of semi-deaf at fifteen per cent., and I think I am entirely on the safe side. I want to state a little experiment that was made at the suggestion of our friend, Miss Rogers. We publish a little paper, in the interest of the aural system, in Omaha. We call it "The Auralist;" and in that we gave a test that had been made with two of our boys in the pronunciation of 650 words, I think it was. Miss Rogers wrote to the paper asking a few questions, among others this: "Can they recognize such consonantal sounds as *ph*, *th*, and such other voiceless sounds through hearing alone?" If I answered that question without test, I should have said, "I think not." I called those two boys into the office, and their teacher pronounced sixteen of those sounds — *s*, *f*, *th*, etc. — and repeated the list, making sixteen sounds — and one boy missed four, and the other, three, showing that those consonantal sounds can be heard. Then, there is another point that I want to speak of, and that is, a tube that we used, similar to one that you all have seen. You put one end into the ear, and hold the other, and let the pupil speak into that tube, and thus correct his mispronunciation, and modulate the voice and find it of great advantage.

Mr. Wines: It may be of interest to mention the fact that at the conference in Louisville last September, this same subject was under discussion. Those of us present there will remember that Dr. Leslie Coombs made a statement that he had in his possession an apparatus which was designed to test the degree of sensibility of the auditory nerve; and, if I understood him, he said that this apparatus, which was electrical in its nature, could be operated in such a manner that the person who was subjected to the test would not himself be aware of the fact that he was being tested, and that the amount of sensibility in the auditory nerve could be recorded on some system. I do not know what practical value attaches to such an instrument, but it seems to me that the fact that there is such an instrument may be of interest to the teachers of the deaf.

Mr. Gillespie: That brings up a subject that I have a little experience in also. I have what is called the "audimetre." It is an electrical apparatus graded from zero to 200, and by making and breaking the connection the current is heard in the ear; and I made some of those tests; and one of these boys that I have spoken of could hear that at about 180 only with one ear; which would make him very nearly a deaf and dumb boy entirely. But, with the other ear, he could hear it down to 20; so that perfect hearing being at zero, he could hear the instrument down to the grade of 20, giving him very far hearing in one ear.

Vice-President Stainer: Is that Prof. Hughes's audimetre?

Mr. Gillespie: Yes, sir.

President Bell: I have an instrument of that kind with which I am now making experiments. In 1871, in the Horace Mann school, Boston, I remember witnessing experiments made with a hearing-tube, and I brought forward the results of these experiments at the Belleville convention. I am sure we should be glad to hear from Miss Fuller on that matter.

Miss Fuller: I have very little to say, except that whenever we found children who could use this tube without danger, we have always used it with them. There are some children whose ears are in a delicate condition, and we thought

it unwise, and have been careful not to use the tube to any great extent. But this is a fact that has interested us very much. There have been some children, and one whom I particularly call to mind at this time, a little girl, with whom, I think, you experimented, named Clark. She could hear the sound of the gong ; but in response to that sound, she made a movement that indicated that the sound was very far away and very slight. So when sounds were spoken or shouted, we were told to be very careful not to make loud sounds into the ear. That child did not use the tube to any great extent ; but as she learned to speak words, familiar words were readily repeated by her. Now, at the age of sixteen or seventeen, she hears, I might almost say, ordinary language. By raising the voice a little, she will hear nearly everything that is said to her. We have others, one of whom, when she came to us, we thought heard nothing. She lost her hearing at the age of five. We used the tube with her, but really it seemed of no value beyond the fact of her responding to slight sound. But I suggested to her parents, that she should use the tube in practicing the piano, that she might hear the sounds of the notes, and she could hear the higher notes very well. She has practiced three or four years with the piano, and plays tolerably well, and uses the tube in conversation with her family, but she reads the lips so readily that she depends upon them mostly.

Mr. Williams, of the *American Scientist* : I understood Mr. Gillespie to state that, in the examination of these children, you stood where the child could not hear you.

Mr. Gillespie : Yes, sir.

Mr. Williams : Well, in the ordinary instruction of these children, is the teacher so situated that the children can read the lips at the same time that they are taking the sound through the ear ?

Mr. Gillespie : In answer to that, I will say that part of the time that is the case ; and part of the time, when the matter of the hearing is the point to be gained, the backs are turned to the teacher, and the lips are not seen at all. We have different exercises, in which both lips and hearing are used, and there are exercises in which the hearing alone is used. So that the work of the school, you might say, is carried on both ways.

Mr. Williams : Do you consider it an advantage to be able to see the teachers' lips a great part of the time — does one help the other ?

Mr. Gillespie : Yes, sir ; it is safe to say that one does help the other.

Mr. Williams : Does the lip-reading help the child in improving its hearing ?

Mr. Gillespie : Let me illustrate. If it is a lip-reading exercise entirely, the teacher uses a very low tone of voice, and it is not expected that the child will hear the voice. And if it is an exercise in which she means that the child shall hear and read both, she will speak louder, so that he can hear. And if it is an exercise in which she wants the pupil to depend wholly upon the hearing, with a direct view of cultivating the hearing, she turns the back.

Mr. Gillett : It seems to me, we are discussing this question without a very clear idea as to just how little hearing one may have, in order to be recognized as a semi-deaf person. You call the attention of the convention to the use of artificial instruments. It is well known that there are a great number of grades of hearing among those persons who are brought to our schools.

Vice-President Stainer : I should be very sorry to lengthen this discussion beyond the ordinary limits, and, therefore, I held back as long as I could, to resist coming forward. It is the subject, I may say, for which I came across the ocean, chiefly to get information, and after the very valuable confirmation, and with great authority, Dr. Gallaudet has given us, in his remarks on Mr. Gillespie's experiments, and after what has been said by Miss Fuller and Mr. Wines and Mr. Williams and Mr. Gillett, drawing forth information from Mr. Gillespie, I may say that the topic is almost exhausted ; but if you will permit me, there is one point on which I would like to ask a question or two. The first is that of the percentage. Although you have probably made it clear to everyone else, I do not see the thing right yet. Is it that fifteen per cent. of the children in your institution are found to be capable of improvement by means of aural teaching?

Mr. Gillespie : Yes, sir.

Vice-President Stainer : Then you have instruments — I think you mentioned Prof. Hughes's audimetre, which I myself use.

Mr. Gillespie : Yes, sir.

Vice-President Stainer : Have you used it to any great extent, so as to give you any record, to enable you to judge of the progress of the hearing?

Mr. Gillespie : I have not. In taking young children and using the instrument, we have no means of communication with them, and they do not understand what we are after and they will say, " Yes, I hear, yes, yes ;" and by-and-by we shall find out they don't hear at all. So that the experiments with young children are not at all satisfactory.

Vice-President Stainer : That is just my experience, and I am very glad you confirm it ; so much so that when I put the instrument up to the 200, they say they don't hear that, but down at zero they do hear that ; so that I concluded that this instrument is not really what we require. It is not a satisfactory instrument ; at least, I have not proved it so. I am very glad to hear from Mr. Wines that another instrument is forthcoming to enable us to determine, because it all hangs on that point. We should be able to say, " This is a child that requires a special instrument ;" and, " This is a child that may go to school." We can't define that unless we have some instrument ; and that is your position, is it not?

Mr. Gillespie : No, sir, it is not. The position I hold is that we draw no line ; that every child who goes to school that has any hearing at all, give him a trial, a good, faithful trial, and if he fails, why that settles the question.

Mr. Gillett : I would like to know what your observation is with reference to the percentage of those who must be taught through the sense of hearing. I understand Mr. Gillespie to say fifteen per cent.

Mr. Gillespie : Yes, sir.

Mr. Gillett : Well, I do not doubt it is so in Mr. Gillespie's institution ; but it seems to be an exceptional case, owing to some conditions we know nothing about.

Vice-President Stainer : If I had accepted the cases that were sent to me, in

all probability I should have been able to confirm Mr. Gillespie's statement ; but my practice has been that if a child is capable of distinguishing the voice in a loud tone that child is not admissible to my classes as a deaf-mute ; that is the line I have drawn. I was rather disappointed in not hearing from Mr. Gillespie something about the audiphone.

Mr. Gillespie : I have used the audiphone in the four classes that have been in the school—the five classes, more or less. The first three or four months' work in those schools we have used the audiphone daily. Sometimes the children like to use it, and good many times times they don't, and so with the teachers ; and it amounts to about this : in some cases the audiphone is of some use, and in a good many cases, it is of no use. As I said before, some children like to use it, and other children don't. It is in the way, and they can't speak. One little boy, when he began last fall—he was the little boy whom the doctor saw standing nearest the teacher—when he began work, he began with the audiphone, and he just gripped that audiphone and held it to his teeth as though it was his life or death. He did that for a month, and finally he thought he could hear without it. He tried that and thought he could hear just as well ; and he wouldn't have anything more to do with it. That is just about the way it works. This large boy, that I have spoken of, says that it makes more sound.

Vice-President Stainer : As I have said, I used the instrument, and some of those here may like to hear my experience, and as I volunteered, when I came here, to give my experience on any subject, I will not sit down until I give my experience of the audiphone. As I have said, it was not satisfactory, and I found a similar result with that Mr. Gillespie found ; it went with a jerk. It certainly does startle them all. Now, the question I wanted to find out, and I think I have arrived at, is this : Is that startling of the children, in using the audiphone, the result of sound as sound, or is it simply the result of a new sensation experienced in the use of the audiphone ? In speaking of the audiphone, it is very common to say that, "Oh, we know perfectly well that conducting substances will convey sound through the teeth and the auditory nerve, so that they can hear better." The audiphone is different from the toy experiments. The audiphone receives sound from the percussion of the air. These toy instruments are in immediate contact with the sound produced, and that makes a material difference. I maintain that the audiphone does not convey sound as sound to the auditory nerve in any way similar to the natural tympanum of the ear ; and I have failed yet to discover that it is of any assistance whatever in enabling my pupils to distinguish articulate sounds ; and if it does not enable the pupil to distinguish more easily the distinction of articulate sound and voice, then it does not become an instrument that we can adopt with any degree of satisfaction.

Prof. Clarke, of the New York Institution : In two series of experiments made in 1868 or 1869, at the New York Institution, our Board of Directors appointed a doctor to examine every pupil in the New York Institution, more particularly to see if any medical assistance could be rendered. In those examinations, he kept a record of those who had any hearing. I assisted him in nearly all of them. Very much to our astonishment, we found that less than twenty-five per cent. of our pupils were totally deaf ; in other words, that there were seventy-five per cent. who had some hearing. We were also very much astonished to find that out of those who were totally deaf, a large majority were what is

known as "semi-mutes" — persons who had lost their hearing from disease, and that there were a good many congenital mutes, who heard some, though not enough to assist them, perhaps, and that among the older deaf-mutes the hearing was generally better than among the younger. The doctor ascribed this to the fact that congenital deaf-muteism comes from an arrest of development; and that in certain cases development may re-begin at some future age, when the child is nearly grown. We have one case in our Institution where I know that this is so — a young man, a teacher, perhaps 26 or 27 years old. When I first knew him, he was 14 or 15. He then heard very little; he now hears so well that I can call him in the open air seventy-five or eighty yards off without any very great exertion. The second experiments were made about ten years later. They numbered 263 deaf persons, including pupils from the very youngest age of six, up to one of our teachers who was over sixty; and the test there for hearing was to be able to distinguish anyone of the vowel sounds. That is, if we found a boy that could always recognize the long sound of "o" or "a," or any other sound, we put him down in the list as of partial hearing. The number that we found that did pick out these sounds was one or two over forty. Perhaps that will assist the convention in arriving at a conclusion as to what percentage of the deaf and dumb have some hearing.

Mr. Noyes: In Minnesota, there is quite a large percentage of children who have partial hearing, and I have been very much surprised, during the past year, to discover the different grades in our more advanced class. The percentage is larger than that stated in the New York Institution. I think the percentage in the higher class will range very nearly 75 per cent. — I mean those that have some hearing. I have in that class one very singular experiment — an accidental one, an interesting young miss about seventeen years of age. In the recreation that our children have in good weather, that of coasting down the hill on a bobsled, she and two or three others met with the mishap of turning the sled over, and her head impinged upon a post and she received a very severe blow. She was for the time insensible. When she returned to school, three or four days later, she had better hearing than she had before. Now the question arises, how came that? The girl was cared for very tenderly; everything that kind care and physician's skill could do, was done for her, to prevent any serious result to the brain; and, so far as we could discover, there was no injury. She rallied in a few hours. The medical treatment and the care might have possibly rendered the sense of hearing, particularly to that ear more sensitive, but the sensitiveness did not disappear as rapidly as we supposed, and had not disappeared on the day of her graduation last month. Her teacher was so impressed with this fact, that he suggested that I take a club and use it upon the heads of all the pupils. I offered to take him as the first experiment. I am satisfied that in the whole school, any interested scientific man would be surprised to find how large a percentage of the children have partial hearing, and I therefore regard this new departure, as it has been called, as a very interesting feature of our work.

Miss McGowen: I had charge, as some of you know, of the class in the Nebraska Institute, which was started as an experiment. In that class was one boy of fourteen, who had been taught by signs in the Iowa Institution. He was for a short time under instruction in articulation, and, so far as we were able to understand him, he said he was dropped from the class of articulation because he could not talk well enough; he had not made sufficient progress to be a hopeful pupil. There was no account of his having any hearing. His parents

moved to Nebraska, and he went into the sign-class one year. He was also put into the articulation-class, and he learned to speak a few words. No account had yet been made of his hearing. Three months afterward, it was found by experiments, that he had considerable hearing. He is still taught by this method, and now I can stand within a foot of that boy and he will understand any word of the thousand that he has learned to recognize by hearing alone, and will understand any of those words in combination in simple language.

President Bell: I think it is evident, from all we have heard to-day, that the sense of hearing can be educated in the semi-deaf, so as to be of use in understanding speech and in learning articulation. It, therefore, appeals to all of us as a very important point, that we examine the hearing-power of the pupils in our institutions and schools. In regard to the examinations that have been alluded to to-day, the results are startling. We have been told that 75 per cent. of all the pupils in the New York Institution have some perception of sound, and the experiments described by Mr. Gillespie show that, at least, fifteen per cent. of the pupils of the Nebraska Institute hear so well that they can be graduated as "hard-of-hearing" speaking persons and not as deaf-mutes. The question is an important one as to the percentage of the deaf in our institutions who have partial hearing. There are other points connected with the subject of a very interesting character. It has been my observation, and from what I have heard to-day, it is probably the observation of others, that a large proportion of the semi-deaf belong to the class denominated "congenital deaf-mutes," who are supposed by many teachers to be outside the realm of the articulation teacher. They are born with partial hearing. The semi-mutes, who constitute so large a proportion of the pupils in our articulation-classes, lost their hearing, in most cases, by the destruction of the organ of hearing itself — or of some important portion of it — by disease; whereas, the ears of the congenitally deaf do not appear to have been damaged in this way. They are, probably, in most cases, simply imperfectly developed.

I have already directed attention to the fact that it used to be the custom in some of our institutions, of summoning the pupils from the play-ground by the ringing of a bell. This demonstrates that some of the pupils could hear the ringing of a bell at a distance, and we now know that, in such cases, the hearing-power may be educated so as to be of use to the pupils in understanding speech. The great difficulty that meets us is, how to test the hearing and what artificial aids to employ. I think that, in regard to the artificial aids to employ, we may be guided by an examination. In all cases, where the membrane of the ear is perfect, we might cautiously experiment with a hearing-tube, but where the membrane is ruptured, as in the case of pupils who become deaf from scarlet fever, a hearing-tube might be mischievous. There is no membrane to receive the vibrations, and hence any apparatus to cause vibrations of the air in that ear would be of little use, and might do harm. In such cases, we might successfully experiment with apparatus formed upon the principle of the audiphone, in which the vibrations of the voice are conveyed to the internal ear through the bony parts of the head. There is good reason to suppose that, in cases where the membrane has been destroyed, while the inner ear remains intact, sounds, which would be very feebly perceived through the ear, might be well perceived when the vibrations were communicated through the bones of the head.

Experiments, made by Dr. Chichester A. Bell, within the last few months, at the Volta Laboratory, in Washington, seem to indicate that the speaking telephone

may be made of use in assisting hearing. Dr. Bell spoke to an ordinary Blake transmitter, which was connected directly to a telephone, without the intermediary of an induction coil. A powerful battery was employed, and a gentleman, who was partially deaf, placed the telephone to his ear. This gentleman had no difficulty in hearing what was said in an ordinary tone of voice, when the speaker's mouth was within two or three feet of the transmitter ; whereas, without the telephone, the gentleman could not understand what was said, unless the voice was greatly raised. When the voice was raised, he could understand, with the aid of the telephone, what was said in any part of the room ; whereas, without the telephone, it was necessary to approach him closely.

In the central offices of certain telephone companies, telephones of peculiar construction are fitted to the head so as to leave the hands of the operator free. It would be perfectly feasible to connect a number of such telephones with a single transmitter, so as to give each member of a class of semi-deaf children a telephone which would bring the voice of the teacher to his ear. As the mouth of the speaker need not be near the transmitter, listening through the telephone would not interfere with speech-reading by the eye.

SPEECH-READING. .

MISS SADIE KEELER,

TEACHER IN THE NEW YORK INSTITUTION FOR THE IMPROVED INSTRUCTION OF DEAF-MUTES.

Perception is the mind's apprehension of external objects and phenomena, and is carried on through the physical organism by the powers of *sight, hearing, feeling, taste and smell*. Every human being normally constituted, possesses these several powers in a greater or less degree. When, however, through some congenital or acquired defect in the physical structure, the exercise of one of these powers is rendered impossible, nature provides by the operation of the laws of *environment* and *adaptability* a tendency to a special development of the remaining powers, thus affording partial compensation for the defect whose disadvantages are thus reduced to a minimum. It is in accordance with these principles that we begin the education of deaf-mutes.

The three principal departments in which we labor are :

1. Culture of the mind.
2. Culture of the voice including every branch of articulation ; and
3. Speech-reading or the special training of the sight and judgment to understand from the lips, the speech of others.

The consideration of the third topic forms the subject of this article. The system of instruction employed in this Institution has never claimed the distinctive appellation of Visible Speech, yet in point of fact it is such, for it is only when human speech becomes visible that lip-reading is possible. The most important modification of the old German system made by Mr. Greenberger, has been to give lip-reading the precedence, in point of time, of articulation, requiring new combinations of sounds and new or unfamiliar words to be learned and recognized from the lips first, instead of as formerly in connection with the written forms.

The first principle of lip-reading is that all words which a hearing child learns through the ear, whether before or after entering school, should be learned by deaf-mutes through lip-reading.

We are led to inquire, secondly, what exceptions, if any, should be made to this rule. I think we may properly except geographical and historical proper names, also technical scientific words.

I would suggest, thirdly, that there be a separate exercise in each class for lip-reading, and that it be conducted in the following manner : In a class of beginners, let the teacher repeat single words or simple directions as,—“ Shut the door,” “ Bring me a pen,” “ Comb your hair,” “ Wipe your face,” etc., requiring pupils to follow out the directions in order to test their proficiency. In intermediate classes longer words and sentences, including questions, should be

introduced, taking care to introduce language adapted to the understanding of the class under instruction. For advanced classes any language used in ordinary conversation may be used ; the newspapers may be read by the teacher to the pupils, and occasionally extracts from the text-books in use.

I would remark, fourthly, since the deaf-mute aims to understand *ordinary* conversation, the teacher should avoid mouthing his words, otherwise a pupil, accustomed to such unusual positions of the organs of speech, will be likely to have but an imperfect understanding of the speech of those who speak in the manner usual among hearing people. Sometimes it is best to emphasize a new word, but afterward it should be spoken in an ordinary manner.

How may lip-reading be most successfully imparted to semi-mutes who, though unable to hear, retain a knowledge of spoken language? If a semi-mute retains a knowledge of writing, let the teacher pronounce single words as "man," "shoe," "boot," writing each one and showing the connection between the spoken and written forms. If a semi-mute cannot write, point to objects in the room or vicinity, and call attention to the positions and movements of the vocal organs and the relation which the spoken forms bear to the object under attention.

THE DISCUSSION.

President Bell : This is a practical paper, ladies, in which I am sure you must be interested, as it enters into the details of your ordinary daily work. I am quite sure that many of you are quite full of the subject, and I hope you may be filled to overflowing, and that we may have the benefit of some remarks from some of the ladies present, on this paper.

Mr. Greenberger : I would like to hear very much what special exercises in lip-reading are in use in different schools, and if Miss Rogers will be kind enough to make the beginning, and let us know what special exercises for lip-reading there are in her school, I should be very much pleased.

Miss Rogers : We have a variety of exercises ; of course, in teaching children in the beginning, they are taught to read a word as soon as they are taught to speak it. Sentences are taught as fast as articulation is taught, and lip-reading is taught simultaneously. We have, in the grammar school, different exercises. We have in each grammar school an exercise four days in a week ; perhaps, in the two lowest classes in the grammar school, the teacher will give some event of the day, something that is going on in the institution ; or, perhaps, some incident connected with her own daily life — that she has been down town shopping ; she tells what she has bought and where she has bought it, and what she has paid for it ; in any event, she will give this in lip-reading, and the children then are required to write it out. In the higher classes, teachers will give some sketch, some biographical or historical sketch — anything of that kind that the teacher thinks best to give. She will write it out and read to the children, and the children are allowed to ask for any explanation that they wish, and the teacher will give that explanation, that they may have as good an understanding of it as possible. Then they are required to write that out. We have our lip-reading exercises with each class. We then have a ten-minutes' exercise, where teachers change and go from one class to another ; they change each way, making the regular circuit of the classes, and, in fact, we have had a variety of exercises. We have had the reading of the alphabet from the lips — not, of course, in the order that the teacher gave it, — giving the names of the letters, because if chil-

dren do not understand a word, it would be very natural for the friends at home to spell the word for them. We want them to become very familiar with the names of the letters from the lips. I don't recall, now, the different exercises that we use in those ten minutes, but that time is particularly devoted to lip-reading by the pupils, who become familiar with the reading of the different teachers' lips. In the grammar school, we don't change our teachers; in the primary school, we do change. One teacher may, perhaps, have all the geography in the school, another all the arithmetic, and, in that way, the pupils in the primary school have had the opportunity of reading the lips of all the different teachers in the school.

Mr. Wines : You teach lip-reading and articulation and writing in the primary class ?

Miss Rogers : Yes, sir.

Mr. Wines : In what order do you teach those ; which do you teach first ?

Miss Rogers : Miss Worcester, will you please answer ?

Miss Worcester : Children in our class this year and in our class last year learned everything first from the lips, every sound, every combination, then they wrote that for themselves, as I said before, of course, pronouncing it. Everything is given them first from the teacher's lips and they pronounce it from our lips. After pronouncing it they write it for themselves, and if they required any assistance, if the spelling of the word was such that they could not spell it for themselves, they received the needed assistance. In the effort to make the children depend entirely upon the lips, we have endeavored to keep our hands entirely still so that we should not be betrayed into using the crayon unnecessarily. We have taught everything from the lips. The teacher, who has had our class in geography, has taught the children to pronounce every geographical name from the lips. I remember, very well, one day last fall, when children came to me to pronounce "Mediterranean sea," they didn't know the word, but they had seen it on the maps, and I would like to say there that the trouble with our geographical names has been to a large degree obviated by teaching pronunciation of them in that way. In our little class this year we had, at the end of the year, quite a large vocabulary learned from the lips ; they spoke the words first, and when they said them nicely they wrote them. One especial effort of ours has been this year to make one repetition suffice for a class. We have, for that purpose, placed the children so that they could see each other's lips, as they sat on three sides of a square, the teacher sitting in the centre — occupying the fourth side — and have tried, just as far as possible, to avoid repetition by confining the children's attention to the teacher's lips, and making one repetition suffice, if possible ; then getting them to watch each other and get from each other what they could not get from the teacher. The work has been done very largely by one repetition on the teacher's part, the children repeating afterward. We have thought that result was very good.

Mr. Wines : I should like to ask one other question. A good deal has been said about teaching articulation by elements, by syllables, and by words and phrases. In teaching lip-reading, do you begin by teaching them to recognize elementary sounds or by teaching them to recognize words and phrases as a whole ?

Miss Worcester : Well, we do both. We do just what Miss Keeler's paper

says. In the very first instance, we say to them : " come " and then " go " without using the hand. Then we say : " Go and sit down " without any action, so that they are reading sentences from the lips from the very first, but our effort in the first instance is directed to the point of enabling them to take such language from the lips as will make the school work go on without interruption.

Mr. Greenberger : May I be permitted to ask another question ? Do they have special exercises in lip-reading with mute beginners — those who come to you who have language but who cannot hear ?

Miss Worcester : In my own experience, I have had but very few. In the eight years that I have been in the school, only one or two have entered our primary department. We have had but few such children come to us, and those have mostly been such as had sufficient development to enter at once the grammar department, with which I do not personally have to do. Last year, the only instance in which I have really taught, I think, since I have been teaching articulation and lip-reading, was that of a little girl who came to us last year at eight years of age, who talked very nicely in a childish way — rather imperfectly in a childish, lisping way, but could not read the lips when she came at all. We attempted to go on with that child, without any reference to elementary drill, such as we give the children who come to us, but during the last few weeks that she stayed with us, we made no satisfactory progress at all. She was taken sick and was sent home. When she came back, at the beginning of this year, I put her into a class where she got the drill, and after that drill, her progress in lip-reading was very rapid. With that child, I found that the best results appeared to be obtained in that way ; she now reads anything from my lips.

Mr. Greenberger : Do you find that such children, who have speech but cannot read the lips, will learn to read a whole sentence from the lips better than a single sound ?

Miss Worcester : I think so, in every other instance, except with this child. I was obliged, with her, to give her some clue that enabled her to see suggestions from the lips before she succeeded.

Dr. Bache : I would like to have it demonstrated, to those present, the amount of knowledge that that class of younger children had. I allude to the last class in the primary department, children who were admitted into the school about the 20th day of September. About Christmas time, if not before, they were taught words and then a vocabulary. Now, I think it would be very well if those ladies who instruct classes, and Miss Worcester who, I believe, has charge of the school, so far as teaching them to pronounce — I should like them to state how many hundred words those little children knew — that is, their vocabulary. I don't say that every child knew the words, but what was the extent of the vocabulary of that little class ? Another reason why I ask the question is, there are not many books for persons who are now instructing the deaf and dumb in this method. Mr. Kinsey has published a book which I have looked over with a great deal of care. I hold to his method.

Miss Worcester : We gave them, up to that time, no language-work. We began then to give them an hour a day, and they learned, up to the first of February, fifty words. I mean that the children in that class could speak those words, could read and write them from the lips. At the end of the year, their teacher handed in for examination, under those same rules, a vocabulary of be-

tween 600 and 700 words, of which there were between 200 and 300 nouns ; but the number which certain children knew in the class was larger than that. I was interested to observe myself, the other day, that this vocabulary contains about the same number of words as is contained in Jacob's Reader. Our great effort was not, however, to teach single words so much as it was to give them instruction and enable them to use those words as they did in hundreds of simple sentences. They used such verbs as they knew in the present and past, using the pronouns in the first, second and third persons. They began their work on the verbs by talking in their classes, first to the teacher and then to another child, saying, for example : " Kitty has two eyes " then of the child itself, " I have two eyes," and " a cow has four feet." Their use of adjectives is very considerable. In going on with the book we found a considerable use of adjectives, and we gave them, as they went on, simple definitions of such adjectives. After they had read from that book, somewhere between 100 and 125 pages, I took it one day as a matter of experiment and began to ask the children the meaning of words for which I had given them definitions — such words as " quarrelsome," " ugly," " beautiful," " shiney," and so on. I had never attempted such a thing as that from the lips before. I found that one little girl in the class congenitally deaf, now eight years old, could read from my lips and give me an answer to the definitions of about two-thirds of the number of words that I had defined for her in that way, though she had never attempted it before.

For their own use of language, they wrote very good little simple letters ; but when I say they wrote, I mean that they wrote nothing, of course, apart from what they could give in regard to a certain object by a very good connected description, as, for example : I know a little girl who came into my school one day, just as I had got a grasshopper. I told her to talk to me about that. She was a congenital. I wrote down the sentences that she pronounced to me ; they covered two sides of the paper. She said : " That is a green grasshopper ; it does and does not ; it can and cannot " — changing the verbs ; " It has a green stomach ; it has two green wings ; " and I believe in fifteen or twenty sentences, which she gave me in regard to it, there were two mistakes. I don't know what more I can tell you, to give an idea of the children's own use of language. I shall be glad to answer any further questions about it.

Mr. Williams : How many pupils were there in this class ?

Miss Worcester : The class was a very small one ; it ended the year with only eight pupils ; we sent away several who entered that class, for one reason and another.

Mr. Binner : I would like to speak of a system I have introduced in my school ; perhaps others have it. I now and then have the pupils give a dictation-exercise ; have one sit down and give a certain number of words and have the whole class go through with them. Of course, their writing down the words proves to me that they have correctly read the words from the lips of their comrades, and, at the same time, the pupils are very much pleased when they have this honor. They always take great pains to pronounce them well when they sit in the chair. I also make it my custom to have visitors that come in give out such words and have the class write them. The class came to the latter part of October, and the peculiarity that I have found in regard to the understanding of the pupils — that is, the reading of the lips of others — is this, that the public school teachers who visited my school and whom I asked to be kind enough to give a certain number of words, were very apt to be misunderstood or not understood at all. But take

the people who were not instructors, and they would come in and speak in their usual way, and they would be much more apt to be understood, and I always had better results from them. I found that teachers coming from the public schools had an idea that now they would have to enunciate in the most strained manner, and they would pucker their lips and use their mouths in a most wonderful way, and the children would not understand them.

In regard to the number of words, it seems to me that quite a number of those present are anxious to find out how many words can be given in so short a time. I will show them how the number of words corresponded with Miss Worcester's. A little over 600 words are what the children have; they have learned to speak, read and write them from the lips; besides that, they make use of all these little sentences that they use in the school-room, for instance: "May I go and get a drink of water?" "Please may I leave the room?" "All right," and such little phrases; such sentences as they have to speak.

Miss West: May I ask Miss Worcester the age of the pupils in this class?

Miss Worcester: The oldest child in the class was twelve years old, the youngest was seven. Before we pass on to another question there is one thing I would like to say, if I have leave, and that is that with my very great interest in the language-work of that class I was not a teacher of language, and that I think the rapid progress that this class made in language, and their enjoyment of it, was due to the fact of their having a very bright and inventive teacher to whom a very great part of the credit is due—Miss Benton—who came to us last year.

Miss West: Might I ask again that Miss Worcester tell us if she found that the child of seven she spoke of made as rapid progress as the one of twelve?

Miss Worcester: Well, in regard to that I shall have to answer that when visitors came into the school we usually showed them in that class the little congenitally deaf-mute child, because she happened to be the only child who was born deaf; and we were usually accused of showing off the brightest pupil in the class. I chose, in showing the progress of the children to visitors, rather to take the child that had no hearing as an example of what we had done during the year than to take the child that had a considerable amount of hearing; and the question usually asked was: "Well, this is the brightest child you have, isn't it?" Then we showed them the other children. The child of twelve I think had more hearing than any other child under my care; she hears so much that she could hear simple ordinary language almost as well as I could, if one would take pains to speak to her, but she could not speak any simple sentence at the end and had made very little progress; her own use of language was almost nothing. In the written examinations, that the children passed at the end of the year, she scarcely wrote one word out of three, and out of the fifty nouns that the teacher handed in she did not write correctly more than one in three, while the misspell mark was 98. So with the other studies, where other children wrote a long description of what they were asked to write, indeed quite a creditable letter, this child, who was the eldest in the class and had the most hearing, was the least intelligent; she was, of course, deficient in intellect.

Secretary Elmendorf: I should like to ask you if you don't find that to be

usually the case—that those who have partial hearing do not acquire the language as quickly as those who have not?

Miss Worcester : I usually find that.

Secretary Elmendorf : For example, I have just received a letter which will prove that very thing ; it is just as you say. Here is a girl writes me, " You can't image "—instead of " imagine "—" how glad I was to receive your letter." Yet in our class there were several congenital mutes who would never think of making that mistake, and yet that girl has almost enough hearing to go to a public school.

Miss Worcester : I found that those who had a very considerable amount of hearing had with it a mental defect.

Mr. Greenberger : In justice to this girl that is spoken of, a majority of the pupils of that class have been with us for eight years, and she, having some hearing and acquiring language more rapidly than the congenital pupils, was pushed through with the lower class so that now she has been in the institution only four years, and is in the same class with those who have been with us eight years, so she is probably apt to make mistakes that others would not make, but she is a very intelligent, bright, little girl.

Mr. Wines : Mr. President, there are several ladies here in charge of day schools, I wish they would give us their experience in regard to lip-reading.

Miss Fuller : I think it has been well described by Miss Worcester ; my experience is not very different from hers. We have various devices for those in the older classes to give them facility in lip-reading. Miss Barton has not given us anything from her school. I hope she will speak. I know that her success has been quite marked in that direction. I think it would be very interesting to know what has been done.

Prof. Gordon : I only wish to speak a word or two in regard to lip-reading. I think it is not best to keep the pupils always upon a strain to catch our spoken words. It does no harm to repeat phrases familiar to the children often. We must not make lip-reading too serious an occupation ; a little fun now and then is relished in the school-room, and if teachers have any conscientious scruples about introducing play there, there are many occasions outside of the school hours when it is very pleasant to the children to introduce some things that are not of a very serious character, but which bear upon their progress in this art. Now, I have found by experience that " This is the house that Jack built," serves a very useful purpose ; it is very well to have the little children repeat these words, taking them up from the lips of the teacher, or friends may be, in the play-room, each repeating in turn from the lips of his little neighbor—" This is the house that Jack built," followed in like manner by " This is the malt that lay in the house that Jack built," and so on to the end. Children enjoy this very much, and better still if they can, at the same time, pass picture cards illustrating each line of the legend. Such an exercise may not be very philosophical, but it gives a vital interest to this subject of lip-reading. Even " Mother Goose " and many nonsense-rhymes and jingles may, after this fashion, serve a good purpose. Such exercises tax the eyes of the pupils but little ; in fact they may be read after a little practice without effort. They give confidence to the children in the art, they encourage them to greater efforts, and I

think it is a good idea to give the children these exercises for their amusement, even if they contribute but little to their progress.

President Bell : I am very sure that anything we can do to amuse the children in this way will aid their advancement.

Secretary Elmendorf : I have often used the same things—not the same sentences. One of my pupils had great difficulty with the “r’s” and I said, “Harry, here watch me : ‘Round the rugged rocks the ragged rascals ran.’” He said : “What is that ?” I told him to repeat it after me and to say it five times, and he did so and he has never had any difficulty with the “r” since.

Mr. Greenberger : The late Morris Hill, whose name is familiar to everyone present, no doubt, mentions in one of his writings the following strange experience : Once they were very crowded in the institution and one of the pupils had slept with a servant-girl in the room adjoining his ; the room was dark and he heard that child converse with that servant-girl. He thought he must be mistaken, but the next night he heard it again and he made inquiries. The child could not see the servant’s lips, and he found out that it placed its hands on the servant’s chest and by feeling the vibrations in the chest the child understood every word that was said. Now, I would like to know if there is anyone present who has tried similar experiments ?

Miss Worcester : I wanted to say something to Prof. Gordon, if I might be allowed to do so, in regard to a practical use of “Mother Goose.” The teacher of the class that has been referred to, finding that the little child had considerable hearing, was kneeling down by her bed and folding her hands, taught her to say very nicely—before the period to which I have referred at which the class work in language commenced—“Now I lay me down to sleep,” and every night she said that. A little later the teacher taught her “Little Jack Horner,” and two nights afterward the dreadful rumor went through the room that little Kitty Treaner was kneeling down at her bed with folded hands repeating “Little Jack Horner”—of which it might be said that she was offering the latest and best thing she had.

Prof. Gordon : There is on record the case of an Italian who is said to have understood conversation in the way just described by Mr. Greenberger. Then there is another interesting case recorded in a little book, now very rare, written by John England, who attempted to establish an institution for the deaf and dumb in Aberdeen about 1819. England was not a man of high education, but he was of a benevolent mind, and it so happened that early in life he found a few deaf-mutes among his companions and he at once became interested in their education, and especially in establishing means of communication with them. At one time he was housed with a deaf-mute, a fellow boarder, and he tried to carry on his education at odd times. Both were very busy at manual labor during the day and occupied the same bed at night. England relates that the boy placed his hands upon his chest, neck and lips, and found that he could understand the vibrations of the spoken words and carry on quite a conversation, and they talked night after night in that way.

Mr. Binner : This reminds me of a little experiment, which I really had almost forgotten, but which I still intended to try again and shall try again some other time, and it is this : I thought the matter over, and it occurred to me that as the palm of the hand was so susceptible of feeling, how would it do to

teach a deaf-mute to carry on a conversation at night in the dark by holding the palm of his hand close to the mouth of the speaker. I blindfolded a number of my pupils and then had them hold their hands against my lips. I spoke words. Well, they did understand a few, but the question arises, might this not in the last few years of their being in school — either this or the other by putting the hand upon the chest — might that not be developed into something that would be useful to them? Of course, it would not do to begin at the beginning, but later on when they had acquired a certain amount of speech, might not one or the other method be developed and made useful to them? I certainly am going to try the hand to the lip. Perhaps somebody else might try the other and we might arrive at something.

Secretary Elmendorf : Mr. President, I see one of the girls who is a very good lip-reader present, and if you like I will try that experiment. If the girl is willing, I will show you exactly how I did it.

[Secretary Elmendorf then tried some very successful experiments with Miss Ada B. Smith, a pupil of the New York Institution for the Improved Instruction of Deaf-mutes, testing her ability to read the words, that he uttered, by feeling his breath upon the back of her hand and by holding her hand upon his chest and throat.]

Mr. Ely : I remember, at the Northampton conference, seeing a case of lip-reading by touch. I think it was one of Miss Fletcher's pupils. A friend brought a young lady who said she frequently read her mother's lips at night by the touch. We have in our school a young lady who does the same thing. Her mother says that she often communicates with her at night, and her daughter reads her lips by the fingers.

Mr. Greenberger : Is she totally deaf?

Mr. Ely : Not entirely, she is nearly so ; she is a very quick lip-reader ; in the daytime she can converse with anybody, she does not depend upon her hearing at all.

Miss Worcester : Without giving the matter any special thought, so that I could speak exactly, I have often, in going at night after our little children were in bed, put their little hands on my lips and made them understand me, I have not infrequently done that and found them able to understand me. I suppose it is from the motion of my mouth in talking.

Vice-President Stainer : These experiences, I think, are very valuable, and they ought to encourage all of us not to limit ourselves within the sense of sight. It appears that even the sense of touch may be brought to account, and I was just going to give you a similar experience to what Mr. Ely has told us, only in another way. I think it is more effectually shown — the sense of touch — in a blind person. You all of you know the case of Laura Bridgman. I found a case similar to Laura Bridgman's : her name was Mary Bradley ; Mary Bradley corresponded with Laura Bridgman. This Mary Bradley, being in the same institution which I established and conducted for seven years, used, although blind, very frequently to gather from my servant's lips, who had no mode of communicating with her the directions that I wanted to give, things that I wanted her to do ; and I can confirm, therefore, what Mr. Ely has said in this matter, that as regards understanding speech to a certain extent, it is not only possible, but it is

actually a fact that has been fully carried out ; I have witnessed it myself and can bear witness to it, that the sense of touch can be cultivated to almost a sixth sense. It can be proved by a fact with which, perhaps, some of you are acquainted. Laura Bridgman, at the Perkins Institution, and whom I had the privilege of seeing the other day, seeing how much I was interested, said : " I should like to show Mr. Stainer how I thread the needle." She asked for a very fine one, and she took the needle in her hand and felt it ; and, distinguishing the point from the eye, she then placed the eye to the tip of her tongue. She got a thread, twisted it in her fingers, and in a second or two pulled the thread through the needle. The sense of touch, at the tip of the tongue, had been cultivated to that extent, that she put the eye of the needle in the horizontal direction, and holding the thread brought to a point, could feel the thread go through the eye of the needle. Seeing how pleased I was, she said : " I will put another one in a very fine one," and she did. Here are the needles [showing them].

Miss Rogers : I had a sister at the same institution. I had heard my sister say, that when they wanted blind children to thread the needle, no one could teach them ; they could show them how to put the needle on the tongue and take the thread and lay it upon their tongue, but no one could show them how they were to draw that thread through the needle ; they would offer them some reward and the blind children would work until they found how to do it.

Mr. Williams : A few years ago, at the institution at Hartford, there was a deaf and dumb blind woman, named Julia Briggs. One of the things she was called upon to do, from week to week, was to sort the clothing of the girls after it came from the wash, and she could do that unerringly from the sense of touch. It happened that there was a pupil there from the State of Georgia, who died at the institution. Her clothing, some of it, was given to some of the pupils there, and after several years, Julia one day took up one of those dresses and instantly told whose it was.

Mr. Greenberger : I think it would be well to obtain some information on this point. In our institutions our pupils have an opportunity of reading the lips of a limited number of persons only ; they learn to read the lips of their teachers and the few people who live in the institution. It would be very interesting to know to what extent lip-reading is used by them after they leave school. Now, there is a gentlemen present to-night whom I wanted to introduce to you for sometime, and I think this will be a good opportunity of introducing him. I mean Mr. Isaac Rosenfeld, the venerable president of this institution. His daughter was one of the first pupils of our school and she has done great credit to us. If Mr. Rosenfeld would have the kindness to tell us what his experience has been in this regard, to what extent his daughter is able to go out in society, to do her shopping, and to understand strangers, etc., we would be very thankful to hear from him.

Mr. Rosenfeld : Ladies and gentlemen : Although I have had an unfortunate experience with my own child, yet I am happy to say that, as far as she has gone, she can do and speak just the same as we do. She can converse in any society. She knows all the idioms of the language and has no difficulty whatever in conversing with anyone and even at distances much greater than Mr. Greenberger has tried this evening. I believe myself, although it may be presumption on my part to say so, that she is an exception to the rule, and I

further believe that the efforts her mother and her father both have made while she was quite young to educate her, have produced a better result than the children who are taught here in this school, and are entirely left to themselves when they come home, and not cared for as a general thing. There are very few parents, I believe, who take the trouble, when the children come out of school, to care for them. When our child left school and came home, it was my solemn duty, as well as that of my wife, to take time and instruct her. Whenever she spoke a wrong word or syllable, we corrected her at once and made her speak it until she knew that word perfectly well. Now, if you hear her speak you will, with the exception of a little difficulty in the tongue, find that she speaks as well as anyone of us here, and perhaps better than I myself. I believe she knows more words than I do in the dictionary, and as regards the meaning of the words she has no difficulty at all. We even went so far as to take a teacher of elocution and she learned it perfectly; but it made her so nervous and excited that we gave it up. She was very fond of it, and when she recited she was altogether excited. Finding that it would not do her any good, we left it off. She began studying French of her own accord and with wonderful rapidity. She acquired that language in a very short time. Yet to-day she knows very little of it, because she did not find a stimulus for continuing it. The same thing she did with German, but not by herself; we engaged a teacher for her and she can read from the lips in German as well as in English, yet she does not speak it. She can write it, but she does not speak it, because she has not studied it. I think that the more trouble we take with mutes—that is, with the deaf, I ought to say; in my mind there are no mutes; it is only deafness which brings on the muteness; if the children were not deaf they wouldn't be mutes—the better can speech be cultivated; it only depends on our own energy and perseverance; it is to be driven and drilled into a child continually. If the child makes a mistake it is to be corrected at once and the word has to be repeated as often as possible in order to correct it.

I think that our school, I may say, has made great progress, but I am very much pleased to say that when I was at Northampton and saw Miss Rogers's pupils I was quite astonished to see their proficiency. They speak remarkably well, and I at once saw that the children had good teachers. That is the only school, so far, I have visited in the United States, and I am glad to say that our example, and the example of the Northampton school, is spreading all over the country.

I may say that we are the parent school. I may also say that I believe I am the father of this institution. A great deal is owing to my wife who spurred me to act; but, nevertheless, I have gone and seen my friends in the beginning of the institution. When we had but six pupils I saw that my child was progressing so splendidly that I couldn't well keep it to myself. I wanted this society to spread and went to see my friends and explained to them my idea of founding an institution for that very purpose. Then the idea of lip-reading was entirely new in the United States. There was not one school here, no, not a single school in the United States; that was in 1867. I saw several of my friends, they encouraged me very liberally and we came together in my house, made our by-laws, and so forth, and the thing was done, the institution was established. In the beginning we sustained and maintained the institution through private collections; we had about 300 members who each paid ten dollars a year, and by that means, and of course other friendly means besides, we were enabled to carry on that school for three years at our own expense. After that the school

was growing and growing — our expenses were more and our income was less. We sought State aid and through influential friends received it, and ever since that time you see the result that is now before you.

Ladies and gentlemen, I think that what the trustees have done during that time is very commendable. I don't take any merit to myself, because I believe that there are a great many of my colleagues who have done much more than I did myself, although my hand and heart were always open for this institution and I hope to bring it to a still greater perfection.

Miss Rogers : I only want to say that I wish all of our pupils might have such fathers ; their lip-reading and speech would be very different from what it is now.

Mr. Wines : I wish to say that the remarks of our venerable friend remind me of what the Rabbi Sohnschein said at Louisville, last September, when he called our attention to the fact that in Hebrew the word for *charity* and the word for *justice* was one and the same. There is no charity which is not justice, and there is no justice which is not charity.

President Bell : This discussion will shortly have to come to a close, but still we shall be very glad to hear from any teachers their experience as to how far lip-reading has succeeded. Let me appeal once more to our lady friends in particular.

Mr. Greenberger : I would like to hear from some of our friends in the Horace Mann School. Miss Fuller, I would like to know if you can give us some account of how far your pupils can read the lips of strangers.

Miss Fuller : Conversation with strangers, I think, is confined almost entirely to the older pupils. The little children have not sufficient language, or rather the congenitally deaf children have not sufficient language to converse with strangers. But the semi-mute children do so far as the language of a child would allow them to understand the questions which are asked them, and little instances that are related to them by persons who come as strangers to the school ; but their language is that of very young children.

Mr. Greenberger : I meant the further advanced ones. Perhaps it would be well to see what that little girl you have here can do.

[Miss Lottie Bailey, fifteen years of age, then read the lips of Mr. Greenberger and others in a very satisfactory manner.]

Mr. Williams : Mr. Rosenfeld said that he considered his daughter an exception. I would like to ask Miss Fuller if this is not also an exceptional case.

Miss Fuller : I think she is exceptionally bright. We have no other child who is as quick as she is — no other congenitally deaf child, I should say.

Dr. Peet : Is this a congenital mute ?

Miss Fuller : She has never heard. We have a boy of eleven who is as bright and quick as she. He lost his hearing at the age of three months, but he has a greater amount of language for his years than she has. His speech is not quite as intelligible but he reads the lips as well.

Miss McGowen : I would like to hear the two pupils talk to each other.

[Miss Bailey and Miss Smith went upon the platform and conversed fluently with each other for several minutes.]

Mr. Greenberger: I would like to state that I consider Miss Smith a very bright pupil, but, in justice to the others, I must say that she is not the very best specimen of lip-readers that we have. We have one or two that read the lips with even greater readiness than she does, and anyone who wants to have a corroboration of this statement will be welcome to visit the school while my pupils are here.

Mr. Rosenfeld: I want to say that the meeting has afforded us a great deal of interest and positive pleasure. It has given us new ideas and I hope all of you who have been here will, when you go back to your happy homes, take some new ideas back with you and inculcate them into the minds and into the thoughts and into the lips of your deaf-mutes. I hope that all of you who have been here believe that the trustees have done all that they possibly could to make you comfortable, and I wish you a hearty farewell.

THE MUTE CONSONANTS.

PROF. SAMUEL PORTER,
WASHINGTON, D. C.

The mute consonants have been divided by grammarians into three classes, viz. : *tenues*, *mediæ*, and *aspiratæ*, or smooth, middle, and rough. By modern phonetists, the *aspiratæ*, being or having become pure breath-sounds, are not reckoned as mutes. So that we now make but two classes, viz. : the *tenues*, *p*, *t*, *k*, and *mediæ*, *b*, *d*, *g*, which we call surd and sonant, and which some prefer to distinguish as hard and soft, or as sharp and flat, or as strong and weak.

About the nature of the difference between these two classes, and hence about the terms by which to designate them, there has been a good deal of controversy among philologists and phoneticians. Each party has usually insisted upon some single characteristic as constituting the essential difference. Herein has lain an error of some consequence : and the object of this paper is to set forth the composite character of these alphabetic elements, and hence of the difference between the two classes ; and, by subjecting them to an accurate analysis, to make their real nature better understood.

For the complete understanding of the matter, we need to consider the mutes — the surd, *p*, *t*, *k*, and the sonant, *b*, *d*, hard *g*, — in, at least, four different situations, or syllabic combinations, viz. :

1. As preceding a vowel in the same syllable, and being ordinarily the initial element of the syllable.
2. As succeeding a vowel in the same syllable, and ordinarily the final element of the syllable.
3. As at the beginning of a syllable, preceding *l* or *r*, or a *y* or a *w*-sound, in English, or also *m*, *n*, *s*, *sh*, or *f* and other breath-sounds, in some languages.
4. As succeeding one of the consonants just named, at the end of a syllable.

A fifth situation may also be noted, as medial, that is, after or before another consonant and between the same and a vowel, or between two other consonants.

(1.) As preceding a vowel, the formation of the surds is to be analysed as follows :

What is distinctive is, first, an interval of absolute silence preparatory to the utterance, and then the explosive character of the utterance itself.

This explosive character really pertains, in part, to the vowel that follows. An explosive effect can be given to a vowel without a preceding consonant. It is one form of what is called by Prof. Bell the "glottal catch,"* and is effected by

*Denominated by Messrs. Browne and Behnke, in their book, "Voice, Song, and Speech," as "the check of the glottis."

the sudden opening of the glottis, with the abrupt production of tone by the vocal cords. In uttering the surd mutes, this voice, or tone-explosion, is instantaneous* with the abrupt parting of the lips or release of tongue-contact, that produces the breath-explosion, of which I have presently to speak.

Thus far, it is the effect of the consonant on the succeeding vowel that gives the character which we ascribe to the consonant. This, while it distinguishes the consonant as of the class of surd-mutes, cannot make the difference between one surd, *p*, *t*, or *k*, and another: the vowel explosion is the same for all three. The difference does not lie in the tone, but depends on the breath-sound that is mixed with, or attends on, the tone. We know, in the case of the continuous consonants, that the pure breath-sounds *f*, *th*, *ch*, German, and the sibilants *s* and *sh*, when blended with tone from the larynx, produce the sonant fricatives *v*, *th*, sonant, *z*, etc.† In a similar manner, breath-sound, in this case explosive, is blended with the vowel tone that follows the mute. And this breath-sound differs for *p*, *t*, and *k*; and by it the difference between them is recognized. This explosive breath-sound is a puff, produced by breath accumulated within the elastic walls of the mouth-cavities and suddenly released.‡ Thus, all the sound that belongs to the consonant, and all that distinguishes the surd-mute consonants one from another is simultaneous with the vowel utterance. And thus we have, not a proper succession of vowel after consonant, but a lapping over of the consonant upon the vowel.

There is, indeed, sometimes heard a style of pronunciation in which the breath-explosion comes before the vowel utterance, and which requires an *h*-sound, or rough breathing, to be interposed. "P'ay me that thou owest." "C'ome, p'ensive nun." "Who st'eals my p'urse st'eals t'rash." This, however, is not the normal mode. It smacks of theatrical affectation, or at least, of a kind of over-refinement. When strongly marked, it is really identical with what is admitted to have been the original form of the aspirate mute in Indo-European language. This separation of the consonant from the succeeding vowel tends to throw back the consonant upon the preceding syllable; as thus: *cent-aur*, *plac-ate*, *cap-acious*, *mank-ind*, *prot-ect*.

The vowel explosion with the *h*-sound is a totally different thing from what it is when not so preceded, the *h*-sound necessarily opens the larynx beforehand; while, in the other case, the sound starts with a sudden opening of the larynx.

In the recent work, by G. H. von Meyer, "The Organs of Speech" — which is far better on the anatomy and physiology of the organs, than it is in the analysis

* In some cases, the vowel position may be taken before the opening for the utterance, as in *pea*, *gay*. In others, it may be taken so quickly as to make the vowel utterance virtually co-instantaneous with the breath-explosion.

† This is not, indeed, a full account of the sonant fricatives. Of course, the breath-part of a *v*, or a *z*, etc., or that due to the action of the current simply as breath, will be weaker than the breath-sound for *p*, or *s*, etc., a sonant current being of necessity a slender current. But, what is more important, there can be felt a vibratory action in the lip for *v*, and in tongue and palate for *z*, quite different from what is felt in the case of *f* or *s*. It is a proper tone-vibration, in sympathetic response to the tone of the vocal cords. There is, also, a tremolo effect. Moreover, there is, in some degree, an occlusion of the tone, by the partial closure of the mouth-organs, similar to what is produced in the sonant mutes *q*, *d*, *g*, by their entire closure. Hence it is that the perfect utterance of the sonant fricatives, as well as of the sonant mutes, requires an open and unobstructed condition of the nasal passage.

‡ Not only are the elastic walls — soft-palate, pharynx, cheeks, etc. — expanded, but the air, which is also elastic, is compressed within them. The force that causes the explosion is the reaction of both the distended walls and of the compressed air; with some added force by the vocal current from the lungs.

of articulate elements, — the author says, p. 311 : " There is a hiatus, an interval marked by a breathing, between the consonant explosion and the succeeding vowel." Such a mode of pronunciation is, indeed, possible, as already said ; but it is not the normal mode, at least, not so for Englishmen and Americans ; though it may be, to some extent, a German peculiarity. I think no speaker would employ it in the case of a short vowel, as e. g. in the words *pin*, *pen*, *pan*, *to*, *into*. The hiatus would turn a short syllable into a long one. The syllable *to* would be improperly lengthened out in such a sentence as, " I wish to see you."

There is still another element in the surd-mutes initial, which may be of sufficient importance to deserve notice, namely, the clicking sound produced by the sudden separation of adherent surfaces, — called by Meyer, the *strepitus avulsivus*. The clicks of the Hottentot and of some Indian languages are sounds of this nature pure and unmixed. As mixed with the other elements of initial surd-mutes, though noises of this nature do not form the predominant characteristic, they may possibly, sometimes, have such prominence given them as essentially to modify the sound of these consonants.*

The *sonant mutes*, † *b*, *d*, *g*, are characterized by a muffled sound from the larynx, while the mouth-organs are in a closed condition, the passage through the nose being also closed. As this sound involves an open condition of the glottis, it is absolutely impossible that it should be immediately succeeded by an explosion of the vowel sound — the " glottal catch " — such as we have in the case of the surds. The larynx cannot open abruptly, because it is already open ; and the cords, being already in vibration, cannot be abruptly put into vibration. Nothing of an abrupt nature can be produced, in these circumstances, without an intervening *h*-sound. There can only be a *swell*, not a *staccato*, or a *marcato* ; and the *swell* is not usual or natural.

It thus appears that one character of the sonants, and the one that, in so calling them, we mark as the primary character, is necessarily accompanied by another, namely, the absence of explosive tone-effect in the succeeding vowel. Then, as to the breath-explosion, the stream of vibrated breath for the muffled tone is, as tone-producing, necessarily narrow and scanty ; and the walls of the oral chamber are not in the tense condition that is fitted to give the puff, the breath-explosion, which we have in the case of the surds ; or, at least, not to give it with the same degree of force, if it is given at all.

Now, there are different modes of pronunciation for the sonants, as more or less prominence is given to the muffled tone. It may be very feebly produced, so as to be with difficulty discernible ; or may even be wholly suppressed. Those who are accustomed to such a way of pronouncing, may be led, in their analysis, to overlook the sonant element, and to notice only the other character, namely, the absence of the explosive effect. They may be led to prefer such terms as " soft " or " weak " or " flat," on the one hand, and " hard " or " sharp," on the other, instead of sonant and surd.

* If I am right in my idea of the " glottal catch " as an element of importance in the mutes, we have here a character appertaining to these consonants, that has hitherto been quite overlooked. And I am not aware that the overlapping of the breath-explosion upon the vowel has ever been clearly pointed out.

† In this expression, we have a contradiction in the term itself, if it means that the articulation is sonant throughout. In holding that it is so, we ought, perhaps, in perfect consistency, to rule out the sonants entirely from the general class of mute consonants. They have sometimes been called " impure mutes," and the surds have been distinguished as " pure mutes."

(2.) When a surd-mute follows a vowel in the same syllable, we find another element in its composition. The closure of the lips, or the closure of tongue upon palate which precedes the interval of silence, gives a *percussive* sound, by the forcible impact of the organs, that is quite different from the explosive sound that follows the interval as above noticed, though having the same general character of abruptness. It is more of the nature of a click than of a breath-sound. We can give it by itself, by forcibly striking lip against lip, or tongue against palate.

With this percussive action, there is not only an abrupt ending of the preceding vowel, but there is an audible effect produced by the sudden closure of the organs and the damming up of the current of vocal breath that presses against them. By Meyer it is distinguished as the *strepitus repentinus occlusivus*. Both this and the percussive sounds differ for the three mutes, *p, t, k*.

In the case we are considering, of final surd-mutes, we have, ordinarily, the pure breath-explosion added after the interval of silence; but not always. It is in no case essential for the recognition of the consonant. When followed by a sonant, either a mute or a nasal consonant, of the same organic position, the explosive element is regularly suppressed; as in *cup-bearer, cut down, sit down, at noon, at night*. Sometimes, when followed by a sibilant, a nasal, or another surd-mute, or an *l* or *r*, or a pure breath-sound, it may be almost, but not wholly, suppressed; as in *excellent, rhapsody, hats, rats, acknowledge, Stepney, cut-purse, uplift, uprise, cut-throat*.

When the same mute ends a syllable and begins one that follows, in such words as *cat-tail, scatter, upper, upon, copy, city*, etc., we may, as we please, regard the consonant either as doubled or as split into two parts. We have the final elements of the first syllable with percussive, etc., as just described, and the initial of the second with vowel* and breath-explosion in the manner previously described.

In the case of sonant mutes after a vowel, the yielding action of the oral walls is incompatible with the percussive or other attendant effect in any marked degree. This gives them a character for which the term *soft* or *weak*, is appropriate.

(3.) When an initial surd-mute precedes *l* or *r*, as in *flush, climb, prim, try, crow, acre*, the analysis is substantially the same as when it precedes a vowel, except that, in English speech, the *l* or *r* is given with less of abrupt explosiveness, at least on the vocal side, than a vowel is when in the same situation. In the sonants there is nothing at all of this character, e. g. *blush, glide, brim, dry, grow, eager*. A *y*-sound following the surds takes no tone-explosion, but breath-explosion only; as *pure, tune, cure*; with which compare, for sonants, *beauty, due, gule*. The *w*-sound, in the same situation, may, I think, take both kinds of explosion in some degree; as in *twine, query, acquire*; with which compare *dwelt, guano, inguinal*, etc.†

* The vowel explosion requires in this, as in most other cases, that the larynx be suddenly closed immediately before it is opened for the explosive effect.

† The *ch*, as in *chair*, should here be noticed, being a compound of *t* and *sh*. The *t* may indeed be, and commonly is, formed on the blade, instead of at the tip, of the tongue. The *ch* is not, however, simply an *sh* after a completed *t*; but there is a partial blending, such that the *t* loses its proper breath-explosion, and exchanges it for an explosive breath-sound of the sibilant variety. The explosive modification of the *sh*-sound is here essential. This *ch*-sound may occur at the end (as in *bunch, church*), as well as at the beginning of a syllable, written sometimes *tch* (as in *hatch*), when at the end. But, in that case, it is uttered with less abrupt explosiveness. This comes from what might have been said under the second head

(4.) When a final surd-mute is preceded by *l, r, s, sh, m, n, ng,* or *f,* or any other breath-sound, the analysis is substantially the same as when a vowel precedes, except that there is, perhaps, less of the percussive effect and otherwise less abruptness. Examples are *help, salt, yolk, harp, art, hark,* etc., with which contrast *alb, old, vulgar, orb, word, argue,* etc.

The rule that the *s, sh,* and *f,* must, before a sonant mute, be replaced by sonants, *z, zh,* and *v,* is familiar to all. In such words as *lamp, sent, sink,* the vocal current through the nose can be followed only by breath-explosion without percussion for the mute that succeeds. In such as *glimpse,* the *p* is naturally dropped out.

My purpose does not require a minute special consideration of the mutes as they occur in the middle of a syllable, any further than I have already done. The ordinary combinations, for surds, are such as follow, viz., *spy, sty, sky, spray, stray, scrawl, apse, apt, mats, axe, act, asps, rumps,* and other plurals in *s, mark'd (d=t).* It is almost superfluous to mention that sonant mutes can be conjoined with no other non-sonant articulations.

In connection with the foregoing analysis, an instance of a peculiar defect of hearing to which some notoriety has already been given, is of extraordinary interest. I refer to the case of Mr. Edwin Cowles, editor of the *Cleveland Leader,* who, with the sense otherwise perfect, has never heard a note above, as he says, the sixth octave on the piano-forte, or not over three octaves above the middle C. He has, consequently, never heard an *s* or an *f* or any mere breath-sound; and also, cannot, by the ear, distinguish the sonant continuous consonants one from another, nor one surd-mute from another. He thus cannot well understand, without the aid of the eye, speech as addressed to him. He also grew up with very imperfect articulation, which was finally corrected by special instruction like that by which the totally deaf are taught to speak. Some cases of the kind were observed and recorded by Dr. Wollaston; but none in which the limit of audible pitch was so low, or nearly so low, as in this instance.* The suggestion is offered that Prof. Bell should invite Mr. Cowles to his laboratory for a scientific examination, such as the case has not yet received.

An analysis such as I have attempted to give must be of some utility as furnishing suggestions for practical devices and methods in the teaching of articulation to the deaf. This practical application I must leave to those who are actually engaged in the work. A thorough drill on the several elements, as I have pointed them out, taken separately and singly, might be serviceable as an exercise in vocal gymnastics. And it must surely be of advantage, and essentially important, to note exactly and carefully the differences in what we call the same alphabetic sound, or articulation, as it occurs in different syllabic combinations.

As to the controversy concerning the nature of the difference between the two classes of mute consonants, we see how the composite character of these articulations, with the differing modes of pronunciation in different languages and dialects, might lead to conflicting views as the result of attempts at analysis. If, in the sonants, the element of sonancy becomes reduced to a minimum, or, per-

above, namely, that the surd-mutes, at the end of a syllable, give the breath-explosion, when they give it at all, with less force and abruptness than they do at the beginning of a syllable. — The English *j,* or *dg,* (both in *judge*), is made up of the sonants corresponding to the surds in *ch.*

* The lowest limit in those cases was an octave plus a third higher than in this one; and nothing is said about any inability to distinguish spoken sounds. See the paper by Dr. Wollaston in *Philosophical Transactions of the Royal Society*, 1820.

haps, quite obliterated, in practice, this element will be liable to be overlooked, or will be absolutely denied, and the definition will be made to turn upon other features such as actually present themselves for observation.

This much may, however, I think, be regarded as certain. Since the differences in force and abruptness are mere differences of degree, which cannot any way be made apparent except by adhering constantly to an extreme at one or the other end of the scale, and which really admit no hard and fast line of division, the distinction originally indicated by separate alphabetic characters must have been that of sonant and non-sonant. And, in fact, as was explained in the case of the sonants, the other characteristics grow out of these by way of consequence, and are thus to be regarded as secondary, leaving these to stand as the primary. Whenever, in fact, the sonant element falls out, in practice, from the class to which it properly belongs, so that the two classes become in a measure, confounded, and are thus so readily interchanged as they are by our German cousins, this must be regarded as a manifest case of "phonetic decay," and as a real loss and impairment of capacity in the language.

Prof. Porter then proceeded to read the following paper : —

A POINT CONCERNING VOWEL FORMATION.

The accepted theory of vowel formation is, that the vowels are produced by adjustments of the oral cavity in such ways as to reinforce, for the vowels respectively, certain of the "overtones," or "upper partials," or harmonic notes, that are contained in the tone produced in the larynx. As regards the palatal vowels, the "front vowels" of Prof. Bell, I, at one time, supposed, as others, I believe, have done, that the part of the oral cavity especially concerned was that between the front of the tongue and the hard-palate. I have been led, however, to the conclusion that the part between the back of the tongue, and the soft-palate and back wall of the pharynx is equally efficient, and its action equally essential.

These vowels are divided into what Prof. Bell calls *high*, *mid* and *low*, — of which the vowels in *eat*, *ate*, *at* may be taken respectively as examples, — according as the front of the tongue is more or less depressed. It is remarked by Mr. Henry Sweet ("Handbook of Phonetics," p. 211), referring to Bell's diagrams, that "not only is the tongue lowered [in the front], but the point of greatest narrowness is shifted back, the size of the resonance-chamber being thus increased in both directions." He adds that the passage to this chamber may be as narrow for a so-called "low" as for one that is "mid" or "high;" this passage being the place of greatest constriction between tongue and palate.

The vowels as high, mid, and low are subdivided, by Prof. Bell and Mr. Sweet, into the "narrow" and the "wide." This difference, according to Mr. Sweet, depends on the shape of the upper surface of the tongue, as pressed upward convexly or as relaxed and flattened. The effect would obviously be, while altering the shape of the passage, to make it narrower or wider. In fact, the whole of the tongue is lowered as the passage is widened. Examples are : *feet*,

narrow ; *fit*, wide ; *fate* (without the vanish), narrow ; *pet*, wide ; *have*, narrow ; *hat*, wide. My own view is that there should be marked more than two degrees of the narrow and the wide. When a foreigner from the Continent says, "In this position," or "He is in the city," he falls into what may be marked as the second degree, being intermediate between *feet* and *fit*. Again, when a genuine drawing Yankee says, "He is in the city ;" "There are ten men in the carriage," he falls to a fourth degree of the wide, the tongue being forcibly depressed,

But what I now aim to show is that, whether high, mid, or low ; and of each of these, whether narrow or wide, there is a resonance-cavity behind, as well as before, the place of greatest narrowness, and corresponding in size with the one before ; that is to say, smaller for the high, larger for the mid, and still larger for the low ; and, as I conjecture, tuned each to the same pitch with the one corresponding in front, so as to respond to the same harmonic note in the tone from the larynx.* One effect, of course, is to shorten at each end, the narrow passage, or part of greatest constriction for the mid, and still more for the low.

If we attend to our sensations, I think we can feel that the back of the tongue is somewhat depressed for a high front vowel, and more so for a mid, and still more for a low. Again, if we experiment by putting, for instance, the organs into position for the vowel *ee* in *feet*, and then lowering the front-tongue for the *a* in *fate*, or the *a* in *care*, keeping the back-tongue still in the position for *ee*, we shall find it impossible to utter the lower vowel, or any pure vowel sound at all. Indeed, experiment seems to show that the back cavity is of more importance than the front. For, we can produce the vowels more nearly perfect with the front-tongue not curved down at all, than we can without the proper adjustment of the back-tongue.

There is another experiment that confirms the view I have advanced. With certain of the vowels, uttered on not too high a pitch, it is easy to give a trill of the epiglottis, especially with the vowel *ah*. The most difficult of all for this is the *ee* ; it is easier for the "mid," *fate* ; and still easier for the "low," *care*, or *cat*. This is accounted for by the greater and less depression of the back-tongue, as just described : the lower the depression, the more will the epiglottis stand out across the current of vocal breath.

A wide form of the low front vowel is said to be the best position of the tongue for the use of the laryngoscope, owing to the depression of the back-tongue in this position.

For the *ah* vowel there is but one resonance-chamber, which, as I maintain, is limited to the back part of the oral cavity, having for its rear extremity the larynx ; for its walls the back-tongue, the back and side walls of the pharynx, with the soft-palate also above and on each side, and bounded in front by the ascending branch of the lower jaw and the point where the soft-palate runs into the hard.† It is this back part of the mouth alone that gives the characteristic

* As to the supposed agreement in pitch, the curious and interesting experiment of Prof. Bell, by pencil-tapping on the lips, cheeks and throat, does not, for various reasons, seem to me conclusive against the idea. As to the supposed enlargement of the cavity, all I can say positively is, that the back-tongue is depressed. Whether the cavity is enlarged or not will depend on the degree of depression of the soft-palate, which is known to be actually depressed from the high to the mid and the low vowel position.

† It thus forms sort of a pear-shaped chamber, which is the shape of the artificial cavity for successfully imitating this vowel.

quality of this vowel. The labialized back vowels have also but one resonance-chamber that is of main importance. The same is true, I think, of those denominated by Prof. Bell "the mixed."

In the foregoing remarks I have recognized tone and resonance as the essential constituents of vowel sound, and as giving the vowels respectively their distinctive characters or qualities. Yet I hold that this is not all, and that what is called "noise" in distinction from tone, and modifications of the tone similar to what we have in the fricative consonants, serves an important office in enabling us to distinguish and recognize the several vowels.

How Shall Our Children be Taught to Read?

MISS ALICE E. WORCESTER,

SPECIAL TEACHER OF ARTICULATION IN THE CLARKE INSTITUTION FOR
DEAF-MUTES, NORTHAMPTON, MASS.

In the simple sense of ability to pronounce at sight the words of our written language (in which, alone, it will be discussed in the present paper), this question is one whose difficulty and importance are both sufficiently attested by its continual agitation in the public schools. To any learner, young or old, English spelling must make not a little hard the first steps in the crooked road to knowledge which lies that way; and no one feels more keenly the embarrassment arising from its irregularities and inconsistencies than does the teacher of speaking, deaf children who realizes afresh daily, what a relief it would be to little, puzzled minds and over-burdened memories, if words were spelled as they are pronounced and pronounced as they are spelled. Every such teacher must grow more and more to feel that a pass-key to reading would be placed in the hands of thousands of ignorant people in America and England, to-day, if the words they speak and understand were represented upon the printed page by characters which stood as the unvarying equivalents of the sounds which produce them. Only about forty-two such sounds are needful for English speech. This short alphabet of phonetics once learned, then a little practice for power of combination given — and, *presto*, the work is done! And with what an “Open Sesame” to all that great treasure of wisdom and beauty which lies behind the gates of print, would the youngest, the poorest, the most meagrely-taught enter upon life! “Visible Speech,” with its dream of a wider application as a “Universal Alphabet,” was only one of the outgrowths of discussion among scholars of the need of some such boon to the masses as this.

Meanwhile, however, our troublesome spelling remains unchanged; and, while it is what it is, our question can hardly cease to be asked. Nor do such millennial visions of delightful improbabilities give us much help in answering it, unless we may gain from them a light by which to see present possibilities. If, indeed, we agree that the thing which would make an answer simple would be a perfect system of phonetics, we may well look to see what there is in present conditions which might be made, to any extent, to yield a similar result. But what, let us ask first, would be the advantage, to the deaf, of such a system?

It is safe to assume, in general, that the best principles of work with other children are best also for the deaf, however the methods of their application may need to differ. And, in this case, the solution of the hearing child's difficulty would be also that of the deaf child's greatest troubles. For,—

1. The aid to lip-reading would be almost incalculable. The words which the deaf child saw pronounced would, in the very action of speech, *write themselves* simultaneously in his mind, if each sound had, as was said, its unvarying

representative in a letter or letters. Spoken and written language would thus become, in a fundamental sense, the same; and, while such obstacles would still remain as arise from sounds which look alike in position, and from inability to see all the positions of rapid speech, the great "Hill of Difficulty" would have been removed from the way of lip-reading.

2. The aid to speech would, perhaps, be even greater. Not simply because the deaf articulator would be able to pronounce any and every word at sight, but because words would be written in pronunciation to him, *pronounced to his eye* whenever he saw them; so articulation would be reiterated to his mind at every turn, supplying, in large measure, his present, greatest lack—that mental impression produced by the incessant recurrence of the same sounds, by which, under ordinary circumstances, a child learns to talk. If, then, written words carried with them their own pronunciation, the deaf child would think in speech as far as he thought in words, would read speech, write speech, and every word he met would be an articulation-teacher to him.

To whatever extent, therefore, spoken language can be made to write itself and written language to pronounce itself, to the eyes and the understanding of the deaf, just so far the same thing has been accomplished which the ideal spelling would do. But can this be done to any extent? and how?

The involuntary answer of my own mind comes always in some words said to me by my father, when, years ago, I stood at his knee, myself a little child just learning to read. I suppose it must have been in spring or early summer that those lessons were given which opened Wonderland to me; for it is always morning in my thought of them, with a glimpse of blue mountains through the open window and a sweet, windy breath from the garden outside to freshen the memory of the kind face into which I looked as I said my alphabet—an alphabet of sounds, by which, in the midst of a busy life, my father found time to teach all his children to read. "What are the four sounds of A?" "What is the sound of B?" "How many sounds has C, and what are they?" So the lesson ran, and, following this came the first steps of simple combination. "Give the sound of B; now the first sound of A; now speak them slowly together—now quickly, as you would talk!" A few such lessons, too, I can recall. But the time of which I wish to speak is that which came next; the day when my father opened for me a little, blue-covered story-book. Slowly, one at a time, he telling me at first which vowel sounds to give, I pronounced, and wonderingly recognized, the words which seemed to speak themselves as I put sound with sound. "Say them as you would talk," my father said, "and the book will talk to you." And the book did, indeed! Many little rules, hints as to "silent letters," etc., were given as I went on; but, beyond this point, the only direct help I received was help to use my wits. "Does that sound like any word you ever heard? You have the wrong sound of some letter. Try another, and see if that makes sense. Look at the other words and see what ought to make sense. Think of other words spelled like this, and how they were pronounced. Use your reason and your judgment. *Use your reason and your judgment.*" These were my father's often-repeated words; and, in them and in the sturdy common-sense of his method, lies, I think, a germ of help for this much-vexed question. To do as he did, in gaining for our children all possible help from simple rules, while teaching, still, that all rules are not final; to lead them, from the first, to think and compare and decide; to introduce them at once to that with which they must eventually deal; to use reason always rather than memory; herein lies the secret of the best success. My father's success with his children was rapid and complete.

A few months of such instruction found us, every one, devouring with intense enjoyment, every child's book within reach; and let me say, in passing, that deaf children in a new class taught in a somewhat similar fashion this year, were able at the end of five months to read any ordinarily simple text at sight, with sufficient correctness to be perfectly intelligible; though the rules for pronunciation, which enabled them to do so, had been learned only in course of the development of their articulation, and at that time they had had no "reading lessons" whatever. Take, for example, this, which I heard a little girl of seven pronouncing to herself as she sat in class, one day, from a Bible-roll upon the wall, whose large, bright picture had, I suppose, attracted her attention. I noted, and here italicize, certain words which she mispronounced. The rest were perfectly clear, and neither I nor another teacher, who was asked to listen without seeing the text, failed to understand what was meant by any word.

"Jesus *asked** them where they had *buried* † *Lazarus*. ‡ Then they *brought* § him to the grave. It was a cave, and a stone was rolled to the door of it. Jesus *said*, ¶ 'Take away the stone.' And after the stone was taken away Jesus cried with a loud voice, '*Lazarus* come forth.' As soon as he had spoken these *words*, ** *Lazarus* came out alive, with his hands and his feet bound with grave clothes and his face tied around with a napkin."

Said the teacher of this class, afterward: "I have a bright little sister, seven years old, at home, who has been a year in school. She can read those pages from her primer which she has learned to read in school, but she could not begin to take unfamiliar text and read it at sight like that." Could not this be said of many and many another bright, little child, after its first year of instruction in a primary school?

For the teaching of articulation and of reading, a strong voice has been heard of late in favor of the "syllable" method for the one, and the "word" method for the other. It seems to me, however, that in behalf of our question it may be urged:—

1. That this fact remains: Speech, however taught, is made up of a limited number of sounds, produced by definite positions of the vocal organs. Also words, though each be a unit, are made up of combinations of a limited number of letters, which, in their exact order and number in each instance, the mind must grasp and retain, to enable children later to distinguish between words or reproduce them in writing. If, then, there is any correspondence between the spoken and written representatives of the same idea which will make it possible to learn them, not as two things—separate, arbitrary and distinct, to be connected only by an especial act of memory in each case—but as one, through some essential likeness, time is saved when time is short and very precious, and reason assists memory where the load upon memory at the least is very great.

2. Whether, consciously or not, these positions of the vocal organs must be taken, and with reasonable accuracy, to produce even intelligible speech. The debt our own speech owes to our continual hearing of the same sounds, is demonstrated not only by the speed with which speech becomes indistinct or imperfect when hearing is destroyed, but also, most significantly, by the effect of

* Pronounced *askéd*.

† " *bur-led*.

‡ " *Lazar-us*.

§ " *sounding the g*.

¶ " *as if rhyming with laid*.

** " " " *cords*.

hearing another language for any length of time to the total exclusion of our own. If, therefore, the printed words he sees can be made to *spea*k to the deaf child by emphasizing continually, to his mind, essential things in his pronunciation of them, we have a help for the preservation and distinctness of his speech, which we cannot lightly pass over in considering how reading is to be made of most avail.

3. The aid to lip-reading from an established habit of connecting positions with spellings, instinctively, is also to be considered and is not less important. But I only pause to urge that,—

4. In point of fact, elementary sounds, even when taught only in combination, are made distinct to the pupil's apprehension to a considerable extent, by the necessity, in correcting articulation, of emphasizing the point in fault; and, in teaching it, of bringing out the point to be attained. Such knowledge of them, therefore, as is needful for the intelligent study of their representatives in words, may be given, at the same time, with very slight addition to the work, and without dwelling more upon them in direct articulation-drill than would otherwise be thought desirable.

Among those who teach by sound, two methods of representation are in common use: the symbols of "Visible Speech" and the diacritical marks of the dictionary.

The cause of articulation for the deaf, in this country, owes much to Visible Speech, both from the study of vocal physiology to which it has led, and from the fact that it has offered, through its students, almost the only source of supply for the recent and urgent demand for articulation-teachers. I am glad to express here my great, personal obligation to it; and it has been with reluctance that I have gradually come to the belief, (after using Visible Speech six years, with a large number of classes, and with an earnest purpose to gain from it every advantage for the children) that the use of symbols, with the classes of our institutions, is a hindrance rather than a help at every point. A hindrance, first, to lip-reading; not, as has so often been urged against it, because of the time it takes from the lip-reading of words as ordinarily spelled, by being taught first, but for the reason, not enough considered and far more vital, that it leads the pupil to look only for unvarying representatives of the positions he sees, and to expect, also, to find words spelled by a number of letters corresponding to their number of sounds, bringing a long period of confusion, later, among that multitude of spellings amidst which all his previous ideas must be readjusted. To attain freedom in speech-reading he must be trained, from the first, to consider different spellings of the same sound; he needs to see "silent" letters, and to know that it may be a combination of a number of letters, as well as a single letter, which represents a given sound.

As to speech, no little, undeveloped deaf child ever learned to talk by taking of himself, from his understanding of them, the positions indicated by such symbols. He must be shown how to take them, must be taught, in short, to imitate, as much when they are used as under any other circumstances. They never create speech, what actually happens is the exact reverse of this; their correspondence is explained to positions taken through power thus *already acquired* in another way, or to actions which are involuntary. Moreover, only the simplest, most evident things about such symbols can be explained to a little child at all. At first, and for a long time, they remain, practically, arbitrary signs to him. Better, then, that letters, with which sounds thus learned can be just as easily associated, and which will be in daily use throughout all the years

of his growing intelligence, should be taught first. If there is value to him in physiological symbols, let it be secured by teaching them when he has such mental development that they can be understood.

Diacritical marks are open to the same objection as Visible Speech, while they have not the merit of real, symbolic value. They are purely arbitrary; they are not consistent; and the effort to construct from them any satisfactory representation of such a table of sounds as is necessary for English speech, is indeed a discouraging one. Webster counts eighteen vowel sounds. Ten of these are to be represented by the two marks (—) and (∪) over five letters. The same mark stands for a different sound in every instance, though they are consistent in indicating, in each case, the length of the vowel marked. Let us, then, go on a little. *A* and *e*, marked (*ā*, *ē*), are to be pronounced respectively as in *air* and *there*. But the same mark over *u* (*ū*) gives the sound heard in *urge* and over *o* (*ō*) the sound of "broad *a*," says Webster; while "broad *a*" is marked (*ā*), and to give the *ū* sound to *er* and *ir* they must be written (*ēr* and *īr*), while the two dots which turn (*a*) to *aw*, turn (*u* and *o*) to *oo*. Take a much simpler matter of consonants. Voice added to the sound of *s* gives that of *z*, and to *th* the sound of "hard" *th*. But the addition of voice to *s* is to be indicated by a line below that letter (*s*), while the same addition to *th* is written with a line through it. Not exactly logical or clear, it seems to me, to the mind of a little child whose "reason and judgment" are to be used!

The reason urged in behalf of using these marks in articulation-teaching is, of course, that the pupil will thus be prepared to use a dictionary. But, some time must surely elapse before a deaf child, or any other child, just in school, will obtain much practical help from a dictionary. Meanwhile, apart from the teacher and the school-room, he sees symbols and marks nowhere. The proportion of the words, too, which he will ever look up in a dictionary and deliberately fix in his memory, to those which will thrust themselves upon his notice at every turn — upon the printed page, in his home letters, on the very signs that line the streets — is as one to a million! To give a child, who comes to the dictionary as the rest of us do, with sounds already made to be marked, a key to the "key," which will enable him to use it easily is, in my own experience, not a difficult matter. But, for daily use, the mischievous thing about them both is this: that marks and symbols tend directly to lead the mind away from the habit of reasoning and discrimination. Not finding them except as they are written for him, the average pupil waits to *have* them written and expects to do little or nothing by himself except to commit to memory. With the habit of using them, too, any but the most self-denying of teachers will continually dash them down to mark the pronunciation of new words, rather than to take the precious time from other work to make the pupil reason out the application of rules. The difference in value between that which is memorized simply and that which the mind makes its own by understanding, need hardly be discussed.

And the worst of it is, we do a long work, only to undo it! We spend months in teaching children that certain sounds have certain symbols, or we mark one letter "long" and another "short" only to find in the end that we *must*, if children are ever to be able to pronounce a new word for themselves, give them reasons; teach them rules and different spellings; lead them to think, to judge by comparison and to decide. If, then, this must be done at last, why not at first? We waste time always too short; we confuse our pupils by obliging them to go through one process only to change to another; we retard progress by necessitating a constant, mental translation, if we do anything else.

In venturing to ask, for a few moments, your kindly consideration of a simple plan used the past two years with my own classes, it is not at all because I can claim it to be a sufficient answer to all these hard questions, or even to be a perfected system. The charts referred to below, and given in full in an appendix to this paper, present the result of two years' practical experiments. But they have been brought to this form through many changes, suggested by the daily experience of the school-room; which, while confirming the principles they seek to embody, has constantly opened new possibilities of application. Other changes in details of representation are doubtless still to be made. I only offer them here as a suggestion of work in the direction in which, more and more, I seem to see the light.

Considering that written language, as it meets our children in daily life, comes only in the shape of letters and combinations of letters, my effort has been to see how far it might be possible to lay aside all marks and symbols and to deal directly with the problem in the form under which it presents itself. It does, indeed, seem essential to have some standard representative for each English sound. It is from this need, of course, that marks and symbols have arisen.

1. As far, then, as I have been able to discover any unfailing letter or spelling which gives one of these sounds, I have used it for the foundation of work upon each. These stand first in each group upon the chart. (See Appendix.) Where not even one invariable representative has been found for a given sound, one of those most common is meant to stand in this place. But next, and more needful perhaps, has been the attempt,—

2. To make letters *mark themselves* for pronunciation to the greatest possible extent by their position in words and their connection with other letters. Take for example the sound of long *a*. The simplest and most nearly invariable rule for its pronunciation is that for monosyllables ending in "silent *e*." When this vowel sound is taught as an element, therefore, it is first represented to the pupil in this way: — *a — e*. (See Appendix, Vowel Chart.) Work upon combination *t* once fills these blanks with consonant letters in endless variety,—

{	— a — e
	c k
	— a — e
	pl t
	— a — e
	f t
	— a — e
	n m
	— a — e
	etc.

And the quick teaching of the child's sight, which shows him that the relative position and connection of the — *a* — *e* remain unaltered, whatever the letters may be which fill the other places or however they may be changed, makes its pronunciation a matter of established fact to him very speedily.

Again, *a*, in a similar position without the *e*, has always its short sound.

Representing this element, then, by the position of the letter which produces it, — *a* —, the child fills the blanks as before,—

{	— a —
	c t
	— a —
	m n
	— a —
	th t
	— a —
	etc.

seeing, more and more clearly that the unchanging *a* is left always in a position which will, in future, carry its own pronunciation with it to him. So (see Appendix) with *i* and *y*. So (though with more exceptions in the case of the long sound) with *o*. The child will see these letters, in these relative positions, all his life where he will see neither marks nor symbols. He has no small advantage, then, in being independent of such helps. For, to just such an extent as these rules apply, the pronunciation of written language becomes not a matter of memory but of sight. It is true, indeed, that there is scarcely a rule for English spelling that is not "proved by its exceptions," many or few! But, under this method of teaching, the work of memory is reduced to its minimum. A child, who *knows* that, in general, the position of certain letters in words tells him their pronunciation, has only to remember the exceptions to his rules — as very different, and much lighter matter.

I cannot speak too strongly upon this point. Would that we had a spelling which made infallible rules possible! But as it is, how often does the teacher, baffled by exceptions to the simplest rules he can frame, give up the effort altogether; and fail even to gain for his pupils the benefit of that "half-loaf" of the proverb! Because we cannot say, of all words similarly spelled, that they are pronounced alike, shall we teach the pronunciation of each separately, with no reference to the rest,—leaving thus a mere confusion of likenesses and differences? Or shall we clearly separate from the mass, that portion, often very large and never despicable, of which we can say to our pupils: "Words spelled in this way follow a general rule; knowing that, you need only to learn these, among them, which must be remembered as exceptions." In short, shall we anywhere teach fifty separate words where we need teach only a dozen, or a dozen where we need to teach but one? "It is forgotten," says Prof. Bonamy Price in a recent article on Education, "that memory is far severer for the brain than the exercise of intelligence, and thus the thinking power is struck with paralysis."

Of another point I wish to speak here: the fact that this direction of thought at once leads the child to consider "silent letters," so-called, and their real value in words. To return to the example already used; in — *a — e* the *e* ceases to be a superfluity and becomes a component part of the vowel, avoiding a puzzle of lip-reading which always arises under other methods of teaching. A child sees, we will say, the word *same* spoken for the first time. We will suppose that sounds are represented to him by unvarying, physiological symbols. This word, then, writes itself to his mind thus:

ʊ(rə)

He also knows the written word "same" and its meaning, but what is there, in the picture that this pronunciation makes, to suggest it? Or he has been taught letters, and has learned to represent the long *a*-sound by the letter which bears that name. Then his mental transcription of the word is this, "s-a-m;" which not only fails to suggest the correct written word, but gives a spelling which actually stands for quite a different pronunciation. If, however, he has been taught that vowel in the way which has been suggested, his — *a* — *e* at once makes the framework of the written word he knows; the pronunciation and the spelling coincide and become reasonable to his thought. The real importance of this seemingly simple matter would, I think, be quite apparent, if time would permit a full discussion, here, of the part which a secondary letter plays in the actual spelling of words which contain our long vowel sounds. We find the *a*-sound represented in monosyllables by — *a* — *e*, *ai*, *ay*, etc.; but rarely, if ever, by the letter *a* alone. It often is represented by this letter in polysyllables, but in a great majority of cases is dependent for its value on these same "silent letters" of the root, which must be present to the mind in deciding the pronunciation of the derivative word. A glance at any table of vowel spellings, like that in the key to a dictionary, is enough to open an interesting subject for thought in this direction.

3. Of important letters and spellings having more than one sound, for whose pronunciation no fixed rules can be given, it is taught, at once, what and how many sounds each has to be remembered and decided between. So if the pupil cannot be surely told, for instance, when *ow* will have one sound and when another, he may, at least, know that it will have one of two, and that if his first pronunciation is wrong the second must be right. Such spellings are repeated on the chart, each one standing in the group under every sound it may represent; they are numbered also, after the first in each instance, the better to be connected in memory. (See Chart for *ea*, *ow*, *oo*, *u*.)

4. The most common spellings of each sound are grouped so that they may stand clearly together before the eye and be inseparably connected with the thought of that position, when seen in speech, to assist the mind in its discriminating process.

5. The attempt has been to represent on such a chart just those rules for pronunciation which the elementary language of classes always obliges them to learn as early as possible; the most nearly invariable and the most frequent in application. And then,—

6. To connect these so intimately with the very sight of letters and act of speech, that they shall not need to be remembered, but can be made the base of a continual addition in the shape of short lists of exceptions, or of rules that apply only to small classes of words and the words to which they apply, which must be largely matters of memory.

This basis may well seem a slight affair for so complicated a structure as English spelling to build upon. But, though some of the commonest words, and those first taught are found as exceptions to the rules here represented, of their general applicability let me give an instance. With the new class of deaf children at the Clarke Institution, last year, the first part of the well-known "Jacobs' Reader" was used a short time daily, during the last few months of the year, for the sake of its picture-teaching and simple language. Counting the different words in it, one day, I noted as follows:

Whole number.....	677
Number coming directly under rules on chart.....	510
Number coming directly under first additional rules taught.....	35
{ Number which conform to chart by	
1. Crossing out a superfluous letter. (Example: <i>caff.</i>)	68
2. Showing double force of a letter. (Example: <i>deer.</i>)	
Number which contradict chart. (Example: <i>shoe</i>).....	64

Out of 677 different words, then, 545 should be pronounced at sight by the child well trained in his first year's work, the utmost help needed being a number penciled over a letter here and there. Of the remaining 132 many were, in point of fact, pronounced rightly by the children who used this book, through that instinct of selection, curious to watch in them as in hearing children, which seems to come with growing familiarity with print. If, on the other hand, such charts seem too cumbersome to present to young pupils, the results of work with this same little class may help to prove that, practically, they are not so. The time, from September 23 to Christmas, was given up to such drill on elementary sounds, combinations, and control of breath and voice as seems to us essential to secure good speech. All this work was done from the lips; but while the teacher did not write the children did! With each sound was taught, as its equivalent, the key-spelling on the charts. Then, if a child spent a minute working over a sound, *s*, for example, he wrote that letter on his slate afterward, no matter how many times a day. If it was a combination which he repeated from his teacher's lips, he wrote that. As the first spellings grew familiar, more were added, building his charts up slowly and by degrees. A daily time for penmanship, needful, with other exercises for rest and change of work, helped in the correct formation of the letters thus learned. All was done gradually, with no separate time for this teaching, and no appreciable effort on the child's part — done chiefly in moments when otherwise he would have been unoccupied, or waiting for his turn to recite. But when language-work began in earnest, there was no need in teaching the meaning of such words as *foot, feet, toe, leg, arm, hand, cheek, nose, mouth, tooth, teeth; cat, book, boy, man*, etc., to teach the written form. We gave the spoken word; that — if I may be allowed the expression — *wrote itself* to the child's mind, and he knew what the spelling would be without being told. Of course, the first words taught this class were chosen with some care, that they might fall under rules. But the ease and rapidity with which the children learned, later, the many words that did not, in all respects, conform to their charts, showed how lightly memory was taxed in other directions, and confirmed our belief in the right principle of the work while it greatly exceeded our expectations. More language, more independent use of language, more talking better speech and lip-reading than I ever knew in a class of the same grade before, was the result of the year's work; with ability to read at sight, of which I have spoken, and to write from the lips with a degree of correctness that was most encouraging. The rules these children learned in a year, almost without effort, were the same that I have sometimes failed, in all the five years of their primary course, to instill into classes so thoroughly that the children need not stop to *remember* to apply them. The class of the year before made the same quick response of intelligence to that which strove to simplify their early work and to adapt itself to their reason. The reason even of a very little child is a great power!

APPENDIX.

NOTE.—Dashes show the position of a given letter or letters in words ; as,

y— y initial
—y = y final, etc.

Prepared for young classes, these charts are based upon monosyllables to a considerable extent. Rules for accent, which in polysyllables change, in some instances, the pronunciations here indicated are to be taught later ; while for little ones who cannot understand, at once, much about syllables, the length of a dash may be used to show a "long" or "very short" word to the eye ; as the final *y* (—*y*) in a two syllabled word like *money*, and the final *y* (—*y*) of different pronunciation in a tiny monosyllable like *my*. (See Chart.)

It is also to be noted that *final r* not being a full consonant but a glide, the rules for vowels with consonants in general do not apply to that letter when final. Always influencing the sound of the vowel preceding it, it is considered separately in each case in that relation, as will be seen below. (See *er, ir, ur, ar*, etc.)

Final *b, d, g*, are taught ending with a little breath-sound to relieve the tension ; this is indicated by the —b, etc., of the Consonant Chart.

(bp)

CONSONANT CHART.

p	f	/ sh
t	v	r—
{ k		l
{ ck	th	wh
{ c	th ²	{ ch
{ b—		{ tch
{ —b	{ s	{ j
{ (bp)	{ c (cc ci cy)	{ g—ge
{ d—		{ (dch)
{ —d	{ z	
{ (dt)	{ s ²	
{ g—		h
{ —g		x
{ (gk)		qu
m		
n		
ng		

VOWEL CHART.

{ ee	{ er	{ oo
{ ea	{ ir	{ u ²
	{ yr	{ —w
{ —i—	{ ur	
{ —y—	{ —ar	{ oo ²
{ y—	{ —or	{ w—
	{ —re	{ u ⁴
{ —a—e	ar	{ —o—e
{ ai		{ oa
{ ay		{ —o
		{ ow ²
{ —e—		{ or
{ —y	{ —u ² —	{ au
{ ea ²	{ —a—	{ aw
—a—		{ —o—

{ you	{ -i-e	{ ou	{ oi
{ u	{ -y-e	{ ow	{ oy
	{ igh		
	{ -y		

KEY TO VOWEL CHART.

{ see			{ boot
{ seat	{ her		{ rude
	{ sir		{ screw
{ sit	{ martyr		{ book
{ hymn	{ fur		{ put
{ yard	{ collar		{ want
	{ doctor		
{ came	{ fire		{ home
{ pail			{ coat
{ day			{ potato
			{ throw
{ bell	{ cart		{ short
{ sorry	{ cup		{ because
{ head	{ sofa		{ claw
cat			not
<hr/>			
{ youth	{ mine	{ ont	{ oil
{ use	{ scythe	{ owl	{ boy
	{ right		
	{ my		

How Shall Our Children be Taught to Read a Newspaper?

MISS KATHARINE FLETCHER,

INSTRUCTOR AT THE CLARKE INSTITUTION FOR DEAF-MUTES, NORTH-AMPTON, MASS.

I have been requested to prepare a paper giving the result of my own experience in some kind of school-room work ; and invite your attention to the consideration of the question, " How shall our children be taught to read a newspaper ? "

When I first entered a school for the deaf and was given a class of the older pupils, what impressed me most painfully was not their ignorance of arithmetic, geography or history. In fact, many of them knew quite as much as I did about the length of the longest river, the height of the highest mountain, and the depth of the deepest mine, and could give the capital of every state and nation from Massachusetts to Borriboola Gha. Neither was my profoundest sympathy elicited by their want of familiarity with the master-pieces of our literature. I had seen many a boy and girl as old as these, and possessed of all the senses, who supposed (if they condescended to suppose anything about such stupid matters), that Hamlet's soliloquy and Eve's account of her first experiences in Eden were written by the man who made the grammar, with the laudable object of furnishing material to be analyzed and parsed—which operations they performed successfully, and then, having no further use for those tiresome combinations of subjects, predicates and modifying elements, put the whole thing out of their minds forever. That kind of ignorance, however lamentable it may be, is altogether too common to excite much comment. What did seem to me most astonishing and pitiful in the young people to whom I was then introduced, was their lack of the knowledge which comes neither from children's text-books nor from classic literature, but from that universal educator—the newspaper. And since that time, the question, " How shall our pupils be enabled to read the newspapers intelligently ? " has seemed to me one of the most weighty which can engage the attention of a teacher. Of course, this involves that other question, at the foundation of *all* education of the deaf, " How can *language* be best taught ? " But leaving this out of account for the present, and simply assuming the average knowledge of language possessed by our older classes, the practical inquiry becomes, Shall any regular and methodical use be made of a newspaper in our schoolrooms ? and, if so, just what shall be done with it ? Our first interrogatory is, I suppose, answered in the affirmative in most of our institutions ; but the second is not so easily disposed of. And because I am so much interested in this subject, and so anxious to know how others treat it, I will do as I most earnestly hope to be done by, and give an idea of the best methods we

have been able to work out in my own class, trusting with pious confidence that the very small crumb thus cast upon the waters will return to me swelled up into a loaf after not many days.

And first, I will say that, in this work, I do not depend upon papers printed especially for the deaf. The periodicals regularly placed into the hands of my boys and girls have been the *Springfield Republican*, the *Boston Journal* and the *New York Evening Post*. These have furnished their daily food, with, of course, occasional bits from other papers, both secular and religious, and from the magazines.

For years we have had, and still have (as is, I suppose, customary in most schools of the kind), a daily exercise, in which an item from the paper is explained and talked about by the teacher, for the purpose of introducing new words and of giving information about passing events. This, of course, is indispensable. But the last device, and the most satisfactory to me, in that it is the most interesting to the class, which we have hit upon, is as follows: A half-hour of certain days is devoted to conversation. To avoid those long and embarrassing pauses, which have been known to occur even in the conversation of persons much more fluent than these, a pupil is appointed each day to lead. Before the time for the exercise, he and I take the paper of the day and look it over together, he making a note of the subjects we agree upon as desirable to talk about, and reading carefully what he finds about them, often asking for explanations, and usually (though not invariably) writing out questions. Meanwhile, the other members of the class are reading another paper of the same date, that they may be able to answer any questions that he may ask, having no knowledge beforehand of what they will be. When the half-hour comes, the questioner takes my place before the class, I having abdicated temporarily and sitting by merely as an interested auditor, to whom, however, appeal may be made from time to time, and sometimes taking the liberty of questioning the truth of a statement, or of criticizing language and articulation. The pupil in the chair proceeds to ask questions which the others answer as they best can. If he brings up a topic which no other pupil happened on in the preliminary reading, it devolves on him to explain it to the full comprehension of the rest.

I have been, thus far, pleased with the results of this work, not only because my pupils are thus gaining a knowledge of what is going on in the world, but especially because they are learning what kind of things in a newspaper to read carefully, and what to pass by without notice. When we first began the exercise, I not unfrequently found the questioner strongly inclined to select as a basis for operations such items as:

"FATAL STABBING AFFAIR!"

Last night, in a drunken row, Patrick Murphy was stabbed to the heart by Michael Sullivan, and fell dead."

While acknowledging that the event was of the greatest practical importance to Patrick Murphy, and without attempting to estimate its possible dire consequences to him, I endeavored to show that, as far as the world at large was concerned, it did not matter a farthing whether Patrick was dead or alive, and we then looked elsewhere for a bit of intelligence worth talking about. In this way these pupils have gradually acquired considerable power of discriminating between the valuable and valueless contents of a newspaper, and a habit of disregarding the worthless items — a power and a habit, as it seems to me, of no slight importance in the education of any child.

To show the style of questions asked, I will copy those of yesterday's exercise. (This paper was written May 23, 1884.) It will be understood that they are in the language, word for word, that the pupil used in giving them to the class, but not all of them in his language as he first proposed them to me. If that was incorrect, I made it right for him, and some of them were wholly framed by me. The following are the questions :

- What is the report of the Signal Service Bureau to-day?
- What anniversary was celebrated yesterday in London?
- How long ago did Wiclif live? What was he famous for? What is he often called? How long before Luther did he live?
- What ceremony was performed yesterday in Washington? What is a colossal statue? From what is the word colossal derived? What appropriate music was played at the unveiling of the statue?
- Where did the funds come from for Luther's statue?
- What is the condition of things in Wall street now?
- What two New Yorkers are most talked about just now as democratic candidates for the presidency?
- Whom does Rev. Henry Ward Beecher favor as a republican candidate?
- What did you see in the paper about Prince Victor Napoleon?
- What is the name of the novel that Cable is publishing in *The Century*?
- How does he take rank as a novelist?
- What other American novelist is now publishing a story in *The Century*?
- What is the news to-day from the Soudan? Where is Gen Gordon now?
- What did Mr. Gladstone say in Parliament, the other day, about his Egyptian policy?

It is safe to say, that fully eighty per cent. of these questions were intelligently answered. (I ought to say that we overran the prescribed half-hour by some five or ten minutes.) After stating that the class referred to is in the Clarke Institution, it is unnecessary to say that the exercise is conducted by articulation.

As I said at the outset, this is, I think, on the whole, the most satisfactory work I have ever done in school with a newspaper, because it stimulates pupils to much greater independent effort than almost anything else which I ever tried, and refers them directly to the paper itself, instead of allowing them to suppose that information of this kind must be filtered through a teacher. And I know that if a plan of this kind is adopted quite early (of course adapting it to the slight mental development and meagre language of the class at that period), and continued to the end of the school course, it cannot fail to produce good results. But there are many teachers present of wider experience than I, and of greater fertility in devising ways and means of instruction, who have, doubtless, developed much better ones, and I hope to carry away from this convention some practical suggestions, which will be a help in the future, in what I conceive to be some of the most important work to be done in our schools—the work of enabling our pupils to take the periodical literature which will come to their hands, and sift it, absorbing, retaining and assimilating that part of it which will conduce to their intellectual health and growth, and rejecting the rest. And this is not all. We must make them not only able, in some measure, to do this, but so much in the habit of doing it, that the practice will be continued in after years, because it has become to them a delight indeed, an absolute mental necessity.

In such a herculean task as this, partial and varying success is all that we dream of; but I am sure we all agree that only so far as we do succeed, by some

means or other, in securing this ability and this habit in our boys and girls, only so far do we insure any comprehension of the great topics of the day, in our coming men and women.

THE DISCUSSION.

Vice-President Stainer : I am sure we have all been gratified with this very interesting paper of Miss Fletcher's. It is a subject on which I have felt a great interest. Having been, for many years past, interested in the deaf and dumb and dealing with adults, I have experienced a very great difficulty in getting those of adult age to take any interest in topics of the day. In fact, their education not having been raised to such a degree as to enable them to understand language to that extent, I always looked upon it as an impossibility that they should understand the ordinary topics of the day. I am delighted to hear that in this institution, which is so worthy of commendation, that the pupils can gather these topics from the papers of the day. Miss Fletcher's suggestion as to taking the good from the evil is a very important one—in the newspaper. We know very well that the prominent points in the newspapers are not always the most important ones. I hope and trust we shall have some little discussion on this point.

Secretary Elmendorf : I heartily second all that Miss Fletcher has said in regard to the importance of newspaper reading, particularly that part in which she speaks of the sifting power of the readers. I think if we can imbue the minds of the pupils with the idea that they shall read only the important things, we shall be doing much more than the hundredth part of hearing people. If there was any dreadful affair recorded in the newspapers like this stabbing affair, in which poor Mr. Murphy came to grief, that is read with avidity. We are trying to make our children like ordinary hearing children ; and, if normal people take an interest in such things, I think it can only be expected that deaf-mutes will follow in the same tracks. In regard to newspaper reading, it has been one of the pleasantest hours in my class. I am thinking now of one congenital mute, a girl, who reads a newspaper every day. At any hour of the day, when conversation flagged, I would call upon her and say : " Well, Alice, what did you read in the newspaper to-day ? " " I did not read anything, sir. " " What did you read yesterday ? " She will tell what she read yesterday, and in a few moments the class will be deeply interested.

Another thing. They read this newspaper. It is very difficult for them. They will bring sentences to me, and repeat them sometimes absolutely word for word—very difficult, complicated sentences—and they will ask me what that means. Sometimes, in the busy part of the day, I will say : " I have no time now, I will tell you at recess. " They are sure to remember, and will come up and repeat it again. It shows a desire to know the sentences as other people speak them. I found that this congenital deaf-mute, in writing an examination paper, under my own eyes, under great pressure of excitement, in which she had to answer ten difficult questions in one hour, that her examination paper showed, by the very reading of the newspaper for the past year, what increase of language she had made. The examination was in philosophy, and it was rather a difficult subject for this girl, but she worked very hard, and I was perfectly astounded when I read the examination paper. I am absolutely sure she had no help from any source. Marking the paper as carefully as I could, there were only two mistakes in the English in it. That is a congenital mute 15 years old. I marked as strictly as I could. In fact, I think I was a little prejudiced against the girl. I

am confident her command of language, in regard to that subject of philosophy alone, was helped more than by any other means by this reading of the newspaper, because she got what we would call colloquial and technical phrases. She has often surprised me by using phrases that I never heard another deaf-mute use. I would ask her where she got such a phrase. "Why," she would respond, "I read that in the newspaper. Isn't it right?" I would say: "Yes, you have got it correctly." If we can stimulate them to even the use of slang phrases, why I think we are approaching nearer to making them like hearing people. This is just one of the points that I consider results from newspaper reading. I heartily concur in all that Miss Fletcher has said, and I hope it is half as much in my power, as in Miss Fletcher's, to get the good from the evil.

Mr. Wines: I doubt very much whether we realize how much young children require assistance in reading the newspapers. I have a little girl at home whom I consider pretty bright, and she said to me the other day that she wished she could read the newspaper, that she had tried to read it, but it was like reading a continued story in the middle, she did not know what came before, and I think a great many children have the same feeling that my girl expressed, and need to be helped into newspaper reading.

Secretary Elmendorf: That is just the point. I am very much obliged to you, sir. I have found that those who tried to read the newspaper every day have a wonderful knowledge — of course, I am talking of deaf-mute knowledge now — but they will have a better knowledge of what they have read than one who will take a newspaper up now and, may be, a week afterward. I am sorry this girl is not here now. If she had read the newspaper, she would be able not only to tell you one item, but all that was going on. Take, for instance, the war in the Soudan. We took a little map that appeared in the *Herald* and gave them a description of the Nile valley, of the False Prophet and so on. Well, now, that did not satisfy that girl. She knew that I knew all about it. She could tell you all about what we had read. She came to me about three days afterward and said: "I don't understand this," and she gave me a very difficult sentence about the capture of Berber, and about the false reports and all this sort of thing. She did not understand about the false reports. In fact, I was rather mixed up myself. She wanted to know who did win. I said: "I don't know." In a case like that, you cannot blame a deaf-mute for being mixed up, but she read the articles about the republican convention, and she knew more about it than I did — of course, I knew who was nominated and what a general time they had, but she knew more about the minute things. She had got interested and was accustomed to read the newspaper. I think it is one of the best methods I know about for increasing their vocabulary. Of course, I am talking now about the higher classes. This girl is in the second class of this institution. I think it is proved to be one of the best aids to teaching. It is a sort of a dictionary for them and the best kind of a dictionary, because the definition is not there, and they have to think it out for themselves, or inquire, and they do not inquire by signs, but have to talk.

Mr. Greenberger: May I be permitted to inquire of Miss Fletcher how many lessons they had every week in newspaper reading, and what is the length of time spent?

Miss Fletcher: This exercise is only a weekly exercise. They have a daily exercise, in which I explain things. The usual time in this weekly exercise is half an hour. Sometimes, we overrun it, but we do not intend to.

Mr. Greenberger : Does the newspaper take the place of the ordinary reader, or do you have a reader besides ?

Miss Fletcher : I have a reader as well.

Mr. Greenberger : Do you think it might be advisable to make the newspaper take the place of a reader altogether ?

Miss Fletcher : No, sir ; I do not. I want to give my class a general acquaintance with literature better than they can get from a newspaper.

Mr. Greenberger : Mr. President, in order to give the ladies time to collect their thoughts I would like to say a word. I must say that I have become so much interested in the subject that I give it four hours every week, taking nearly a whole hour every day, and I find that the time is well spent. Deaf-mutes are shut out from the world even though they have learned to read the lips and to speak, still the communication with their brothers and sisters and friends is not so easy as it is with hearing children, and they miss a great deal of general information which they find in the newspapers ; and if newspaper reading can be made useful for hearing children, it certainly is so much more useful for the deaf. I find that they get a knowledge of things by reading the newspapers which they could not get from any school-reader, or from any school-book. Now, I think there are very few people who can keep abreast of the times unless they read the newspapers. I don't think there are many such people anywhere who do not read the newspapers unless a very few great scholars who have special hobbies. Therefore, I have given it a great deal of time and I mean to give it still more time in the future. Of course the New York newspapers are not written for deaf-mutes, but there are a good many things in them that I cannot explain to my pupils for the simple reason that I do not understand them myself. There are a good many things about base ball and such matters that I cannot explain, because I don't know anything about them, but I don't take up any paper without being able to make it very useful.

Mr. Wines : There is one other remark that I want to make in regard to the newspapers and that is, that I think we are perhaps unnecessarily sensitive with regard to the effect that they may have upon children's minds. My observation is that the child's mind sheds the evil that there is in literature much as a duck sheds water. The evil makes very little impression on them, and I think we are very unfair to the newspapers. The evil we find in the newspapers is the evil that is in life, and no man can exist in life without knowing the evil that is in it. A knowledge of the evil that is in life is almost essential to a man's living in it, and I do not believe that children take any more evil out of the newspapers than nature has provided that they should take, in their own interest. My belief is, that the safest thing for a child is, to turn him loose in the library and let him take what he needs. The evil that there is in books won't make very much impression upon him. Those of us, who can recall our experience as children, will know that that is so. I think we are too afraid of putting a newspaper into the hands of our pupils. We sometimes say that a newspaper is not a good family newspaper, but I don't think families are very much injured by newspapers.

Mr. Williams : I think that remark ought to be taken with caution. We

know that the result of it is to bring up a child without very much natural character. We know it is well for a child to have the evil that is in newspapers pointed out to him. I would not keep the newspaper away from the child, but I would know the use that the child was making of that newspaper, and if I found that he was neglecting what was proper, and if I found that he was giving his time to the low parts of the newspaper, I would tell him : "That is not the stuff in the newspaper that is most profitable for you to get ; here are things that are interesting and profitable at the same time." And I think the attention of the child should be called to those things ; and I think it is the duty of parents and teachers to guide them and to help them to what is the right.

Some General Remarks on the Education of the Deaf.

REV. WM. STAINER,
LONDON, ENGLAND.

As to my paper, I sat down last night, after leaving the session, and scribbled one leaf which I won't call a paper, as papers are generally more than one leaf, and which, with your permission, I will just read. It contains a few general remarks that have occurred to me since I have been on this side of the water.

It is not saying much to assert that progress is being made in the method of teaching the deaf and dumb. While all other arts are advancing, why should it be otherwise with that in which we are all of us engaged? The honor of every teacher is involved in the question of progress. But progress may be slow or rapid. Judging from all that I have heard and read and recently seen in the United States, and especially from the fact that this numerous attended convention has assembled to discuss matters connected with the improved instruction of the deaf, I have come to the conclusion that the progress here being made is indeed rapid. In New York. Boston and Northampton, I have, within the last few days, seen results of oral teaching which are highly satisfactory and very creditable to the teachers. The Clarke Institution, specially, deserves commendation, conducted, as it is, by noble-minded and devoted women — Miss Rogers, Miss Yale, Miss Worcester, Miss Fletcher, etc. Better results I have never seen in any school I have ever visited, especially in the lower classes.

As my own sphere of work, at the present time, consists chiefly in establishing and superintending day schools for deaf children under the school board for London, the Horace Mann Day School at Boston was naturally the most interesting to me, and I found there, through the opportunities afforded me by Miss Fuller, a great similarity in our work. The numerous obstacles, and, in some cases, almost insuperable difficulties, attending the instruction of a mixed class of deaf children in a day school, are very discouraging even to the most ardent and zealous teacher, and, therefore, the methods pursued and the results obtained, in that school, were to me most gratifying and encouraging. They, in great measure, confirmed my own experience in a very important point, and that is, that to be successful with a number of children of all ages and capacities, combined with deafness and dumbness in every degree, our methods must be very flexible, so much so that we might, in some cases, appear to be going in opposite directions to attain the same end. Children, who come from their own homes to school for five or six hours, five times a week, as at Boston and London, with no power on the part of the teacher to exercise any control beyond the school-room, or alter the circumstances and surroundings of these children at other

times, cannot fairly be compared with children sent to a boarding-school where they are surrounded, in the large majority of cases, with much more favorable conditions than in their own homes. Again, in day schools we have not the power of selection commonly exercised in boarding-schools, as I could show by pointing out numerous cases, in my classes, of children who would not be admitted into any institution that I know of in the Kingdom. They come on Monday morning, with the school fee, which is 2 pence per week, and a place must be found for them in the class. Their attendance may be for a few weeks or months, seldom for many years, as the poorer classes, in London, are, for the most part, a shifting population.

The great problem I have undertaken to solve is, how all these children can be taught speech by speech. Being an associate of the Training College at Ealing, founded by Benjamin St. John Ackers, Esq., I have hitherto followed, for the most part, the method furnished at that college, and I am assisted by teachers whom I have sent to be trained there, but I have also derived much assistance, in my arduous work, from Mr. Van Praagh, who is at present training for me pupil-teachers I have sent him for that purpose, and has offered help in other ways. Mr. Van Praagh has asked me to lay before you two primers which he has lately published; and I would, at the same time, ask your attention to a book which I have just issued of a very different kind. The chief use I intend to make of it is, to put it into the hands of teachers and say: "Now put that in the cupboard, and when you are dry take it down and there you have ready at hand a lesson and the pictures that you can easily refer to." I think it will be a help to many of our teachers. I do not recommend book-teaching — distinctly understand me on that. The teacher should have the book in his head; that is the best book to use. The teacher should be encouraged to give impromptu lessons upon all subjects, but a book to fall back upon is a very good thing. If I told you that I wrote original sermons without referring to any book in my library, I am sure you would not believe me. Books are very useful, and we are entitled to make use of them. I am sure it will supply a want long felt by many English teachers, and I hope it will be generally used.

I have 250 children in eight day schools in the school board of London. I have also four ordinary houses that I rent on my own responsibility and fitted up to provide homes for those children who live at too great a distance to attend, regularly and punctually, at the centres of instruction without this supplementary aid. I have undertaken this on my own responsibility, and not from any desire to render myself conspicuous or earn the name of philanthropist, or anything of that sort, but simply the work that I am doing in this direction has grown out of the necessities of the case. When you begin a work of this sort in a large town or city, you at once find that the children, being only a small portion of the population, are scattered over a large area. In London, the area is particularly large; it is 70 square miles; and, although I have no doubt there are 500 children scattered over this 70 square miles, it has taken me ten years to bring half of that number together, and I could not have a half of them if it were not for these homes that I have established on my own responsibility, and partly at my own expense, as an aid to the work I am carrying out. Reports and papers relating to these homes are here, and I should be happy to give any information about them. It is a subject that you will be interested in, as probably there are many here engaged in the day-school work at the present time, and others with whom it will afterward be a part of their work; and, as I have now had ten years' ex-

perience of day-school work of the most varied kind, I venture to offer any remarks that may be at all useful.

Respecting the education of the day classes, I may say that some of them are of recent formation. In the early grades the children are advancing very rapidly in the pure oral system. In the more advanced age, they are learning reading, writing, arithmetic and a little geography. But these children, for the most part, are children of the poorer classes of society. I have no children beyond the small tradesmen's class. I have no children, as you have in most institutions, of the middle class or of the higher class. Mine are all children of the humbler class. I find the physical power is not sufficiently developed, and that is one point where my homes afford me great satisfaction. Children sent to school to be taught, to have something put into their heads, with an empty stomach, had better be sent home. I cannot send them home for that purpose, but I can send them to one of my houses and say: "Go and get some food." I can take them into these houses and feed them, which I do, those of them who want food, and there are not a few. That affords me great satisfaction. I said that they are making rapid progress in the pure oral system. This attractive system is absorbing, at the present time, the attention of a large number of the intelligent and benevolent people in the United Kingdom. I say benevolent, because in our Kingdom, you know, our schools are supported, for the most part, by donations and subscriptions. It has been suggested here that in England we have the habit of sending the hat around for charitable institutions. I suppose that has been done, but it is not the general rule. I wish it were so more than it is, because I should get more money because of my influence with my brother clergy; but, as a rule, we get our money from those with overflowing purses who, looking down the list of charities, say: "Deaf and dumb, well, send five pounds to that. Blind, five pounds to that."

That is the way we have to live. It is a great drawback, and I am trying to get the government to acknowledge the work that is being done by the school board for London in regard to the deaf and dumb. For I must here remark that the school board for London is administrative and not legislative. The school board for London can only do its duty in carrying out the Education Act of 1870, which is, from time to time, amended, and, therefore, the school board for London can take these children, but cannot give them any money toward their maintenance or support. That is very good for those children, who can be sent to school like ordinary children, as I have in my classes a considerable number, but it does not meet the case of a large number of pauper children and children of the humbler classes that I have been speaking of, who have not any homes or scarcely any food of their own. Provision ought to be made for these children by the government.

I have said to some friends privately, in this room, that in doing this work I am only filling up a gap; I am only, for the time, substituting an effort which is necessary to do what the government has not yet taken up. I am filling up a gap. I hope a cannon-ball will not come and knock me out and leave that gap vacant, and I hope, if it does, somebody will step in. I see, by a report that has been sent me from the New York State Charities Association, that government help is so liberally given to these schools that it makes me very envious of what is being done in this country; but I hope, by perseverance and patience, we shall succeed.

Well, I have said this system in England is taken up by a very large number

of intelligent and benevolent people. The friends and relations of the children are also continually bearing testimony to the work and the improvements they perceive in their deaf children, who now begin to talk like other children. The perfect restoration of all who are deaf to the full uses of speech, and an entire comprehension of everything that is said, must not be looked for, and such would be nothing short of a miracle. It would be the miracle of 1,800 years ago wrought over again. But we may reasonably expect, in due course, that all those children, who suffer no other infirmity than simple deafness, may and will be taught by the improved methods now being generally adopted; they will be taught to use their once mute tongues in audible speech, and though their ears are still deaf, their trained eyes will read, with almost supernatural power, the motions of the sound-producing organs, and with intelligence decipher words which may be described, though it appears a paradox, as words uttered without a sound.

THE DISCUSSION.

President Bell: I am sure we have all listened, with very great interest, to the remarks of Mr. Stainer and to the paper that has been presented to us from Miss Hull. It must be indeed gratifying to us all to have a word of coöperation from our friends on the other side of the Atlantic. The admirable paper of Miss Hull brings to my mind a curious national difference between Americans and those on the other side of the Atlantic. The Americans like that which is new; on the other side of the Atlantic, that which is old and long established is prized more. You find it even in the inventions of the present day. A new invention is brought out in England for accomplishing some object — a new-fangled notion. They don't want to have anything to do with that until some one else has tried it. It is brought out in America. This is new. It is probably better than what we have had before. We will try it and see how it works. We don't believe that that which is old is necessarily the best obtainable. In fact, we are met together to change our methods of teaching articulation and speech-reading. We are met together to improve our methods. We do not believe that unanimity of opinion is favorable to progress. It is by discussion of methods from diverse points of view that progress is evolved. I think that the teachers who are present to-day, representing, as they do, members of all classes of schools for the deaf, are all at one in their wish to improve and perfect our method of teaching speech to the deaf — teachers of the combined method, as well as those who are purely oral teachers. For my part, I should like very much to question Mr. Stainer upon many points connected with his work in connection with the school board. I will refrain from doing so, however, on account of lack of time, as I know that another occasion will present itself. There is one very important feature in Mr. Stainer's work. I understand that the schools with which his name is so prominently associated are day schools and connected with the schools for hearing children of London.

Vice-President Stainer: In the same schools.

President Bell: And I hope that we shall find out something as to the advantage or disadvantage of mingling together deaf and hearing children in school and out of school. There has been, in the past, too great a tendency to the isolation of the deaf. The first school established, as I have already remarked, was a school in which it was proposed to congregate all the deaf children of this con-

continent, but it was not large enough. The next step, and the step in which we now are, is the step to congregate in one school all the deaf children of a state. We are only now commencing in this country the plan of day schools and schools where deaf children may be separated as little as possible from hearing children. Mr. Stainer's work is a very important work in connection with the ideas that are growing in this country in connection with that subject, and I hope that these points may be developed by questions from the members of the convention. I think there has been too great a tendency to isolate the deaf from the hearing. There has been too great a tendency to isolate the teachers from the teachers of the deaf. I wish that some sort of affiliation could be established between teachers of the deaf or teachers of the blind, and teachers of the hearing. I will not take up the time of the convention, but shall request remarks upon this paper. I believe Dr. Gillett wishes to be heard.

Dr. Gillett : My question will occupy only a half minute. You remember, Mr. Chairman, in 1878, you and I in company made a call upon Mr. Stainer, but were so unfortunate as not to find him at home. I wanted to inquire what proportion of the dumb children in your homes remain in the homes in the course of each week.

Vice-President Stainer : I have two classes of pupils in these homes. One class I call weekly boarders, and the other class permanent boarders. The weekly boarder comes to the school on Monday morning from his own home, or is taken there from a distance of perhaps three or four miles. After the afternoon session, the child is brought to my home a few days and sleeps there one night — we call it a day. Tuesday the same, Wednesday the same, Thursday the same. There are four nights, we call it five days. On Friday morning, when the child leaves my home, he comes to the school and attends the sessions there. After the afternoon session he goes to his own home. Therefore, that child is only with me four nights out of the seven and part of five days. The remaining two and a half days he is with his own parents, and this I consider, in many cases, a very great advantage. The permanent boarders in my homes are those who have no homes of their own — sent to me by the parochial authorities, the poor guardians, etc., who pay for their maintenance in my homes, and I send them to the schools as day scholars. I have some others sent to me from different parts. Mr. Ackers, the founder of Ealing College, is a subscriber to my work, and has sent me one recently from the parish of which he is a poor guardian, and I feel proud that Mr. Ackers, a man of his standing, should send a child to me as a proof of his confidence in the system I have initiated.

Mr. Williams : What proportion of your pupils are permanent boarders ?

Vice-President Stainer : Well, I think I may say three-fourths. In the first instance, I established these homes as temporary homes, my especial object being to bring together those children who resided, we will say, within three miles. You must understand that in London it is a very difficult task for a child to go half a mile to school, the crossings are so numerous and the traffic is so great, that a deaf and dumb child, even in a quarter mile, might get lost or run over, and so parents find it a convenience in sending them somewhere temporarily during the week. That was my object in establishing these homes. I had a large board painted for the first home, "Temporary Home for Deaf Children." It was my intention to carry that out as far as possible, but the permanent boarders have grown out of the necessity of the case.

Mr. Williams : You say three-fourths ?

Vice-President Stainer : About three-fourths ; three-fourths of those that are in the homes.

Mr. Williams : Well, what proportion of all your pupils are in the homes ?

Vice-President Stainer : About one-half.

Mr. Williams : Then about three-eighths of the whole are permanent boarders ?

Vice-President Stainer : Yes.

Mr. Williams : In the course of your paper, you stated that many pupils came to you and were received by you, who would be rejected at any of the other institutions. Now, on what ground would they be rejected ?

Vice-President Stainer : The benevolent institutions — they are all benevolent in England — the boarding schools in England have a list of questions to be answered by the parents or guardians, before a child can have its name entered on the list-book, as a candidate for election by vote. That paper must be filled in and the questions include as to the child's amount of hearing and as to the child's mental capacity. I mention those two — no others — its amount of hearing and its mental capacity. The children who are brought to me, and whom I am compelled to admit to my schools, are children that have a large amount of hearing, and others are mentally weak. Those children would be at once refused, and would not be allowed to have their names entered on the list of candidates in most other institutions. The medical officers would refuse them.

Mr. Williams : Yet you find you are able to benefit them by the instruction you give — they are not idiotic.

Vice-President Stainer : They are not idiotic, and that is the great problem I have to solve — what to do with these children. A statutory provision ought to be made. They are not proper subjects for a school for deaf children, to be taught by teachers that are trained to teach deaf people to speak. A primary school or nursery would be best for many of these cases. Mr. Gillespie has thrown great light on this subject as to those children who have a large amount of hearing, and I thank him very much. As to those mentally weak, we do not hope for so much for them, still a great deal might be done without sending them to our schools for idiocy.

Mr. Wines : In the first place, you say these children under your charge are not idiotic. I want to ask whether you call them feeble-minded ?

Vice-President Stainer : Yes, that is better.

Mr. Wines : We give a great deal of prominence in all our schools of instruction to handicraft. Are your children susceptible to instruction in handicraft, and if so, how do they get it, and where ?

Vice-President Stainer : Do you mean the whole number of children or these feeble-minded ?

Mr. Wines : I speak of the whole number under your charge.

Vice-President Stainer : Nothing is done as regards industrial occupations for the deaf children under my charge. In the first place, the school board for

London, of which I am an officer on the staff, have no power to provide any form of industrial training for children. In the homes that I have established, it is probable that this growing out of that, and this growing out of that, and this growing out of that, and so on, that in the course of time — it may be a very short time — the necessity of a special home, or an attachment to one of my present homes, may be found desirable — I might say necessary — to give some of these children an opportunity of following industrial occupations, and if I am satisfied and have the means and the power to carry it out, I intend to do so.

Prof. Gordon : I would like to ask a question. You may remember, that at a conference of the governing bodies held in London some time ago, a member of the London school board (Miss Müller) spoke of the work carried on for the deaf in connection with the public-school system, and referred to the fact, that, in the actual working of the plan, it had been found not without certain disadvantages from a mental and moral point of view. I would like to ask you whether those difficulties to which Miss Müller alluded have with further experience been overcome and obviated?

Vice-President Stainer : In what connection? In connection with the classes?

Prof. Gordon : I think it was with reference to the children attending school and living at home.

Vice-President Stainer : You mean as an objection to day schools? What do you wish to draw out of me? Is it that you want to know whether there is a disadvantage in connection with day schools as compared with boarding schools, in connection with going backward and forward?

Prof. Gordon : A member of the London board said that there was a difficulty from the home influences tending to impair both the instruction and the discipline imparted at school, and that this was often productive of unfavorable results.

Vice-President Stainer : Oh, I am not responsible for what a single member of the board says. I cannot notice what a single member of the board said and I would tell that member so.

Prof. Gordon : I hope our friend has not misunderstood my question nor its animus. We all know something of the progress of the great work so enthusiastically carried on by Mr. Stainer. However, no system is perfect, but all systems may be improved, and I presume Mr. Stainer has, by establishing "homes," and perhaps in other ways, reduced or removed the difficulties publicly alluded to by Miss Müller.

Vice-President Stainer : As to the difficulty of children coming from their own homes to schools, I grant you that it is one of the grave objections to day schools that we have not full power over these children. They are not under our control except during school hours, and the moral influences of their homes are very often very detrimental to them. We have the same difficulties in our other schools. Why should we take notice of that in connection with the deaf child? All our hearing children are subject to home-influences because we only have day schools, and so are the deaf children. Deaf children are subjected to the influences of home whether they are for good or evil, and we cannot help that in that respect. As regards the point, my experience is this: I think we want both systems. I think we want boarding and day schools. Those who

have no proper homes, numbers of whom I have the privilege of taking out of their homes where they do not get proper physical or mental food — we want homes and institutions for that class. We also want day schools for those people who are willing and desirous of sending their deaf children to school with their hearing brothers and sisters and having them educated as far as possible like hearing children. We must have both systems in London to a certain extent. The homes that I have established meet the thing half way because they provide for that class.

President Bell : I would like to ask to what extent the deaf children under your charge are in the habit of mingling with the hearing children, and I would like also your opinion as to the effect upon their articulation and upon their power of speech-reading of mixing and mingling with children who themselves naturally speak. These are questions that are very important to our teachers of articulation, and I would like to have the light of your experience.

Vice-President Stainer : When I commenced my work in 1874, I had a very strong desire to mix these children up as far as possible. I would even have them in the same school-room if possible. It was thought advisable, on consultation, to put them in a little class-room by themselves, as they must have a special teacher and this special teacher considered it would be greatly to her advantage to have her children to herself uninterruptedly. The point was so far conceded that I began with the children in a class-room by themselves. They are in that class-room during the hours of education. As soon as the class breaks up they go into the play-ground and mix freely with the other children. Well, I must confess that there is something like oil and water about it. You know you may put them together and you may mix them up. They seem to mix, but they are not assimilated ; there is a suppression afterward and the deaf children do not, up to the present time, freely associate and assimilate with other children ; but provided they don't mix in the games with the others, provided they do not yet talk with them, because they are not able, but they may do so when the system has become more developed, — that I am not prepared to say, but at the present time I freely confess that their power of speech is insufficient to enable them to communicate with the other children ; provided I find that only now and then they do communicate — that it is exceptional — provided all that, I maintain that the deaf children brought up with other children, allowed to see the habits of other children, going to school like other children, living in homes like other children, when they grow up, must necessarily be better than when they are isolated as they so often are.

Miss Warren : I would like to ask if any of those children have become self-sustaining members of society ?

Vice-President Stainer : I have already spoken of that, that the school board has no power to do anything in the way of industrial business. As a private individual or as chaplain to the deaf and dumb — as I also hold that honorary office — I must say that a considerable number of boys who leave my schools are apprenticed to trades in the ordinary work-shop, sometimes by moneys raised by their friends, sometimes by fees that I raise for them through charitable and other sources, and sometimes they are taken without a premium. The boys are placed out in that way to learn a trade, and my experience, so far, has been, that these boys brought up in day schools, constantly associating with hear-

ing children and learning the ways and habits of others, do better in the work-shops than those children who go out from boarding institutions.

Miss Shaw : Mr. Stainer spoke as if there were exceptional cases of these deaf children playing with hearing children on the play-ground. Do you know, in such cases, whether the deaf children are exceptionally bright or of good intellectual development ?

Vice-President Stainer : No, I will explain that. It arises very commonly. It is difficult for me to give statistics but I guess. I am thinking now of one centre where I have fifty children in London. There are four class-rooms ; each of those class-rooms contains about twelve. In each of the divisions I should think there are one or two children who have hearing brothers and sisters attending the same school. Now, those hearing brothers and sisters are given the privilege of coming into the class-rooms. The hearing brothers and sisters of my pupils have permission between one and two o'clock, or any time afterwards, to come in and join their brothers and sisters. That is an encouragement both ways. It encourages the other children to mix with the brothers and sisters of their school-fellows, and these little fellows do make efforts to make themselves understood to their brothers and sisters. The cases are comparatively few, and I don't like to give a matter of that kind prominence lest I should be thought to be exaggerating.

President Bell : I understand, Mr. Stainer, that some of the deaf children under your care play with the hearing children and talk with them, and I also understand that the reason why more do not is that they do not talk sufficiently well to be able to communicate at present. May I ask, then, whether those deaf children, who do mingle with the hearing children, are those who talk best ? Whether you find that in proportion to the power of articulation and speech-reading possessed by a pupil that his power of mingling and joining in the games of hearing children is in the same proportion ?

Vice-President Stainer : Certainly it is, and I would say this, that in addition to those comparatively few who have brothers and sisters, those semi-mutes, who have the power of speech though deaf, are frequently observed leaving their fellows and joining some of the hearing children, but it is not so general as I should wish, and as I said before I don't like to bring forward a small matter and make it look like a big one. I hope it will develop.

Secretary Elmendorf : Do these children, who communicate on the play-ground for instance, communicate by voice or by gesture ?

Vice-President Stainer : For the most part the children in the play-ground communicate by very baby language as infants in their nursery. They are not expected to say, "Will you give me a cup of water ?" before they know their letters. They will say, "water," perhaps. That is a baby language that no nurse would think it well to suppress. We would not say you cannot have the water until you say, "Will you be kind enough to give me a glass of water and I will be very grateful to you." The children are not permitted to use signs, but they are not entirely suppressed.

Secretary Elmendorf : I should consider that talking certainly, if they use the voice.

Vice-President Stainer : Oh, they use words.

Secretary Elmendorf : Well, it is using the voice instead of gesture.

Vice-President Stainer : Certainly, many of them will continue to use their baby language for some time until they are more developed.

Mr. Gillespie : I would like to ask what proportion of your children have hearing, if you know.

Vice-President Stainer : I cannot give you the exact numbers. I am, at the present time, making a series of experiments ; but, as I think I have already intimated, I have not a satisfactory test-instrument. Prof. Hugh's instrument, so far, has, in many cases, failed, as I think I told you. When it is put at the loudest they say they hear no sound, and when it is put at zero they say that is splendid music, and therefore for want of a proper test-instrument I would rather not give any statistics on that point. I am going into it carefully, but I should prefer not giving statistics until I get a sufficiently good test-instrument to give you something satisfactory in each case.

Some Elementary Language-Exercises.

MISS CAROLINE A. YALE,

ASSOCIATE PRINCIPAL OF THE CLARKE INSTITUTION, NORTHAMPTON, MASS.

It is not the purpose of this paper to discuss systems of language-teaching, but only to suggest a few exercises which have proved of value in the task of giving spoken and written language to deaf children, especially to those in primary classes.

A bright child may learn without carefully devised methods on the part of the teacher ; but the most careful work will produce none too good results with the slow, dull pupil, or even with the pupil of average mental capacity. I have no hope that any of these suggestions will be new, unless to those who are comparatively young in our profession. The fact that, as yet, the actual teaching of the deaf under the oral system in this country is, for the most part, in the hands of young women of but a few years' experience is, perhaps, a sufficient excuse for offering a few hints of so unpretentious, but I hope practical, a character.

Direct Grammatical Teaching for Young Children.

The greatest difficulties to be overcome in the acquisition of our language are connected with its verbs. It would, therefore, be well, at the outset, to furnish a child, so far as possible, for this fight, by showing him the mechanical construction or the "how" of the verb-forms, though it be quite impossible to tell the "why." If the verbs "to be" and "to have" are first taught, beginning with the present tense, do not count the work complete until the pupils can readily form a large number of sentences in regard to themselves and their classmates, using the seforms, as : "I *am* well ;" "You *are* well ;" "Mary *is* well, etc." "I *have* a mouth ;" "You *have* a mouth ;" "Kittie *has* a mouth, etc." If other verbs are to be taught first, the variations in the forms of the present are less : "I *see* a tree ;" "You *see* a tree ;" "He *sees* a tree, etc," until the addition of the *s* for the third person, singular, becomes a matter of positive knowledge.

When a child thoroughly knows and readily uses the forms of this tense, he may be taught the forms of the past and future. With a stuffed bird, a model, or a picture, the work is easy. "I *see* a bird ;" "I *saw* a bird ;" "I *shall* see a bird " (by and by). Though the words, "now," "before" and "by and by," may be used in place of the names of the tenses for a time, the usual past, present and future may soon take their places. Let every new verb, then, be taught in all these forms. Let the child recite them orally ; write them, and construct sentences containing them. The filling of blanks, in sentences which contain

a time-word or phrase, will greatly assist in this last, as with the verb "to sit : " "I *sat* in church *yesterday* ; " "I *sit* in a chair *now* ; " "I *shall sit* on the settee *very soon*." Just here will come the opportunity to teach that, with certain words and phrases as "often," "all the time," "every day," and the like, when used in regard to an action belonging alike to past, present and future, the present form is always used as "I go to church every Sunday ; " "I often go to the city," etc. The auxiliary verbs "to be," "to have," and "to do" should have full share in this drill—at what point in the course, each teacher must decide for himself. With these and the simple forms of the verbs well mastered, another step may be taken, and this, it seems to me, is too often left to chance—the *conjugation of verbs in their negative and interrogative forms*. The pupils should know that "do" and "did" are words which, put with the already familiar present and past, make questions of statements, and with "not" deny them, as : "Do I write ? " "Did I write ? " "I do not write ; " "I did not write." These should be taught as thoroughly as the simple form "I write." The progressive and emphatic forms can be taught with little labor when this foundation has been laid.

When the perfect tense is added, the child should know which verbs in his vocabulary are formed, by adding to the unvarying "have" and "has" of the perfect, the *present* as "have *run*," or the *past* as "have *walked*," or a form all its own as "have *gone*." Let him be made so familiar with all these that he can give the present, past and perfect as hearing children give the principal parts of verbs. So familiar, too, that all errors in the use of these forms may be corrected by a question as to time or subject.

Pronouns offer another serious hindrance in the way of a deaf child's progress in the use of language. It seems, therefore, wise that much direct work should be put upon the forms of these also. May I suggest that our children often find themselves hindered rather than helped by the common habit of teachers of giving them the exact words of a sentence? An illustration will make my meaning clearer. The little child attempts to say that he has cut his finger ; the teacher begins, "I cut"—. The teacher cuts his own finger and again says, "I cut"—. Would it not be better to say to the child, "You cut your finger," obliging him to change the pronouns for himself and say, "I cut my finger?"

Description of Pictures.

For the first work in this direction, pictures containing only a single figure may well be used—the figure of a person, an animal or an object. These first pictures should be preceded by descriptions of real people, animals and objects in like positions and in like surroundings. With the questions, "Who?" "What?" "What-doing?" and "Where?" the nouns, verbs and adverbial elements may be put clearly before the child's mind before the formation of sentences in regard to the picture begins. The answers to these questions may, at first, stand as separate sentences as, "That is a boy ; " "He is playing ; " "He is in the snow." Very soon, however, these may be combined as, "That is a boy playing in the snow." Some such general statement of the main idea of the picture should form an introduction to every picture description. If pictures of single objects be thus taken first, there will be much less difficulty in securing topical arrangement when the number of objects is increased as it should be very soon. The same course may be followed with different classes of pictures. To those

of persons, animals and objects, add rooms, shops, houses, fields, streets, woods, mountains and sea-views. These subjects may, each in turn, occupy the time allotted to this exercise during a period of some weeks. So far as possible, work on each subject should be preceded by descriptions of real objects or places actually seen.

Last summer I saw in one of the German schools (a school of most complete appointments but of meagre results) a set of models for primary teaching—models of fruit, vegetables, animals, tools, etc. The director, showing these with great pride, said that pictures should never be used where models could be obtained, adding "five out of six children, having been taught from pictures, would not recognize the object when seen later." This statement is, of course, an exaggeration. Nevertheless care must be taken at every step to make pictures, especially those in regard to which a class are to use language, very real. Surely neither a model nor a picture should be used when a real object is at hand. A pictured peach may show finer colors than a real one; a wax peach may be freer from blemishes than a natural one, but these are not sufficient reasons for their being used in place of the real fruit which the child may touch and taste. If he is to know what a peach is, he must know its odor and its taste as well as its form and color.

Before any class of pictures is left for another, the pupils should repeatedly write independent descriptions of new pictures similar to those already studied with the teacher, and no class of pictures should be left until the pupil can use easily the simple language needed to give an intelligible description of a picture belonging to it. It is well at times that the story of a picture should be written. It is better to separate this clearly from the description of what is actually to be seen in the picture. The pictures taken from children's magazines, and from illustrated papers, furnish ample material for this work. Mount then on stiff brown paper, classify them, put them in large envelopes with the name of the class plainly written at the upper edge, place them in a box in alphabetical order, and you will delight yourself continually in your riches.

Letter-Writing.

That the letters of young deaf children should often fail entirely of that letter-flavor which we recognize but do not name, is not to be wondered at when we consider his ignorance of language and the lack of special teaching in this direction. It is only a bright child who, untaught, attempts to answer the letter he has received; the dull one fills his pages with journal-sentences or reproduces the sentences of a model letter. A common practice among teachers of the deaf is to give pupils such model letters to commit to memory. A wiser plan seems to me is one which induces more thought on the part of each pupil. Let each child be provided with a blank-book on one page of which the teacher shall write questions in regard to his letters received since last letter-writing day. With his letter before him, let him study these questions. Later let him write on the opposite page answers to these questions in full sentences, making a connected reply to the questions and news of the letter. This done, let the class choose the topics on which they will write, and let them assist the teacher to put on the black-board questions in separate groups about each topic. They may be led to choose these topics so as to give their friends as much information as possible in regard to their surroundings and occupations. These questions are to be answered by each child as those about his home letter were. This work should be corrected by the teacher, studied and reproduced from memory by the pupil.

This method soon gives the child the idea of answering the letter sent him and of arranging the whole in topics. Some child will have received no letter since the date of his own last writing. This he may be taught to say, and then be led to ask the questions about things at home which he would be glad to have answered when a letter does come. Those of us who are familiar with the letters coming to our pupils, will readily see what a help such a letter may often be to the parent in writing an intelligible letter to his child. By this plan of work the time soon comes when a child left to himself will plan his own letters and execute them very creditably. It is well to remind him of the new words he has learned since he wrote last, and to induce him to try to use them for the pleasure it will give his friends to see that he is gaining in his knowledge and use of language.

Uncorrected letters sent home *may* be a stimulus to children to gain in accuracy. In order that they may prove so, the work sent home should be the *best* the child can do. The first draft of his letter should be carefully examined and he be told if there are mistakes in the work. It may even be well to tell him the number of his mistakes, not *what* they are or *where* they are. In this way he is induced to think over each sentence carefully and may often correct a great portion of his errors.

The beginnings of such a plan as this had been already developed in our own school, but I found it still further developed in the school connected with the Training College at Ealing, London. The results attained there and also in classes of our primary school, during the past year, have been such as to make us sure that good results may be obtained by a continued use of work on this general plan.

THE GERMAN SYSTEM.

MISS S. HULL,

LADY PRINCIPAL OF THE TRAINING COLLEGE AT EALING, LONDON,
ENGLAND.

[Miss Hull's paper was read by Rev. Wm. Stainer, who prefaced the reading as follows: "There is no greater work being done in England than that which is being carried out so successfully at Ealing College for training teachers. I may tell you that I send my teachers there to be trained, and I have taken from that college half of those that have already passed through and obtained their certificates to assist me in my work in the London school board. Although not officially connected with this important institution as a paid officer, I have the honor of being an associate. Miss Hull is too well known to you for me to make any comments upon her work. She is now the lady principal of this college, and I am very anxious that this college should be represented on this side of the Atlantic; and as this paper has been placed in my hands, I will ask that I be allowed to read it."]

The intense interest taken by our Ealing Society, in the advance of "speech for the deaf" throughout the world, is well known to you. We regret much that none of us can be personally present to show our special interest in the spread of that cause in America; but we know you will welcome our associate, Mr. Stainer, with your usual hospitality and kindness; and we beg you, at his hands, to receive from us our warmest wishes for the success of this conference. Of my personal experience as a teacher of the deaf most of you have heard — how my work in England began in 1863, the same year in which my friend, Miss Rogers, commenced hers amongst yourselves; how, in earnest seeking for the best good of my pupils, I tried many methods.

Visible Speech was first applied to the deaf in my school, and the success met with there proved an incentive to Prof. A. Graham Bell to carry the same method into use in your country. This first gave me speech for my deaf-born pupils. I had always used it when deafness had been caused by illness after speech had been acquired, for I never dared have hushed the voice I knew God had once given; though, I grieve to know, this is often and often done in sign-schools.

In 1872, I came to Miss Rogers, at Northampton, to witness her success with lip-reading, and to adopt it as the sole means of communication with my pupils, which I had not done till then. From 1873, speech and lip-reading were rigorously employed in my school as the only means of instruction; but still I had not the German system. What now I desire to lay before you is my experience since the full light of the German system came to me, and to share with you the knowledge of the blessings it — *in its entirety and only so* — can and does bring to the deaf.

Regarding, in this light, the program of this conference, I cannot but feel that questions 2, 3, 6, 7 and 8 would have found no place there, had those to take part in the discussion been all acquainted with the system followed in Germany —

that system which, since the congress at Milan, has been otherwise known as the "Pure Oral."

There have been and are many other methods of teaching the deaf to speak more or less, to be found in use; but these are outside our inquiry. A research for such may be interesting for future historians of methods; but time now is all too short to apply to those needing our help that system which, handed down from generation to generation in its mother country, is fully capable of doing all we desire, of enabling all who will employ it to rest from farther *experiments*, so baneful and hindering to the subjects of them; and to go on in firm security that the well-laid road will lead to the desired goal. Leaving, then, all question of other methods, I propose, with your permission, to shortly discuss, from a German system stand-point, the first nine questions of the program.

1. *First Steps in Articulation.*

This is a subject on which Germans themselves vary as to the order in which the sounds are to be presented to the pupils, the breath and other helpful exercises to be combined with the course, and the length of time to be devoted to these preliminary exercises. As a noticeable instance of this, we find that the order in use at the famous school at Riehen differs materially from that followed in the older schools.

Mr. Kinsey, in adapting the German system to the English language, has adopted a well-thought-out plan of arrangement which we find of the utmost benefit to our pupils. With his permission, I will briefly describe the method of using his first book of "Exercises in Articulation."

The pupils having undergone an introductory drill in exercises adapted to fix their attention and insure their obedient imitation of every movement made by the teacher's mouth, the series of breath-articulations are taught, — *h, wh, f, th, sh, p, t, s, k, ch*. These are thoroughly practiced till they can be produced without fail, — pronounced, read from the lips, written, and read again from the written form. If difficulty be found with any of them, such as *k*, that letter is left, to be returned to at a later period; but no other powers are taught till these have been thoroughly acquired.

Then come the vowels, taught in the order given in the book: *ä, å, oo, ou, o, er*, as they are sounded in the words *fäther, fällt, food, foul foal, fern*; being taken first, then combined with the breath-powers initially, finally and with combinations of those powers. When these sounds have been learned, the vocal equivalents are proceeded with.

But the special value of Mr. Kinsey's arrangement consists in not teaching the nasal elements *m, n, ng, nk*, till the very last, thus avoiding the risk of a nasal tone being imparted to all the vocals — a fault to which the deaf are peculiarly liable when this order is not observed. Valuable exercises are also given, on page 38 of the book, by which to eradicate this nasality of tone, should it make its appearance even after every care has been taken to prevent it.

2. *Voice-Training.*

This is not a feature of the course followed in German schools, if by it is meant the attempt to procure varieties of pitch from deaf children.

The attempt to produce these inflections, in young deaf children, is likely to lead to very harmful results, sometimes begetting a falsetto or bass tone which is unnatural, unpleasant to the hearing persons around, and too often beyond

the power of the teacher to alter when once acquired. No doubt, instruction in careful reading in a loud, clear voice, with particular attention to punctuation, ought to be given to deaf pupils, in the last year or two of their course, but this is at a time when the value of distinct speech can be understood by the children, and when their attention is not required to grasp the meaning of the language with which they are dealing — it having, by this time, become to them a familiar means of intercourse. Such exercises at an earlier stage would, in our opinion, simply lead to failure or worse.

3. *Speech-Reading.*

Speech-reading is so integral a part of the German system that it calls for no discussion, except as regards the time and way in which rapid lip-reading should be sought. Nature herself points out very clearly a guide on this point.

Lip-reading, as a separate study, is only known to adult persons becoming deaf after they have acquired language. These, according to their attention and study, will acquire the art perfectly in six or twelve months. Why do they learn so soon what deaf-born children acquire so slowly? Simply because they have language.

The command of language, then, must be the gauge of truly rapid lip-reading. As the children's command of language increases, so ought the rapidity of their lip-reading. To seek to make them read the lips rapidly before they are capable of grasping the language uttered, would be to violate one of the fundamental principles of the German system, in permitting one branch of study to be in advance of the others. To acquire this power of rapid lip-reading, combined with the knowledge of language, the German system is most emphatic in its method of teaching by question and answer. Not by questions to be answered briefly in the affirmative or negative, but by answers embodying the whole of the language given in the question, and adding also the information required.

In the first stages of instruction, even up to the fifth year, these answers should, as a rule, be written on the black-board at the time, and should be reproduced as an independent exercise later in the day; the same subject being gone over and over again, till the form of the sentences and *the meaning of the subject in every variety of those forms*, has been grasped by the pupils.

The glory and groundwork of the German system is—language, language, language. All else must give way to this. Let us give our pupils the power to grasp the meaning of their mother tongue, in all the varied forms in which it presents itself to the minds and tongues of the hearing, and then we have given them a treasure that exceeds any other gift in our power to bestow. For this reason all subjects as such—history, geography, science—must be kept in a subordinate position. No one of them must be attempted till the language fitted to teaching it has been acquired to some extent, and when we do allow them to be undertaken, still the language, not the matter of the subject, must be the first object. *Festina lente* is our motto here; and, as in the old fable, it is the patient tortoise and not the swift-footed hare that will gain the desired goal.

Religious teaching I have not included in this list, but the same observation, with one exception, applies to it. In this, no doubt, the subject itself is of the very first importance, and for that very reason, we must be most careful to proceed slowly and to make sure that the real meaning of the language employed is thoroughly understood, before, in our anxiety to teach much, we fill our children's minds with vain forms that to them have no living reality.

4. *Classification of the Deaf in Regard to Articulation-Teaching.*

I hope I shall be pardoned when I say that this word "articulation" grates on my ear. We never say that we teach our infants to articulate. Why not say that our deaf children learn to speak or to talk as our infants do? It is the simple truth—a like process, a like end. The term "articulation" strikes a chord in unison with the combined method, and we know that that means a sad loss to all instructed by it.

In teaching the deaf to speak, there seems but one legitimate opening for classification, and that is the separation of the weaker-minded from those in possession of full powers. It may, and indeed seems most advisable, as Miss Yale and I had the privilege of seeing at Schleswig, under Herr Engelke, that the weaker minded should be taught in a separate school; or, as was seen at Milan, in separate classes; but there can be no question as to the system on which both should be taught—that that must be by speech. Where a child can be taught at all, it will, without doubt, be most successfully taught on the German system.

As to the question raised in the *American Annals* by various writers, as to congenitally deaf, semi-deaf, or semi-mute children being separated, such separation is not recognized in the German schools. It stands to reason, that a child, who has become deaf after acquiring speech, will rapidly pass through the first stages of instruction and be ready for a higher class. Let him take his place in that higher class without question when he is ripe for it. His rapid advance will be an incentive to his class-fellows, and no drawback to himself; but let us not deprive the deaf born of the advantage of mingling with those who already have speech, by parting the one from the other.

5. *Artificial Aids to Hearing.*

These seem beyond our range. If a child has sufficient nerve-power to be benefited by instruments of any kind, his education will be best conducted individually and ought not to take up the time of teachers bound to class-work in our schools. Home is the best place for individual teaching, which cannot elsewhere be given without sacrificing the time or needs of others.

6. *How Best to Make Speech the Vernacular of our Pupils.*

The answer is so simple, it seems almost rude to give it.

Speech will become their vernacular when no other means of communication is used but SPOKEN LANGUAGE; writing and reading, of course, holding the same position they do in the education of hearing children.

7. *Difficulties Caused by Irregular Spelling.*

As to difficulties experienced by deaf articulators on account of the irregularities of English spelling, I must say I have never experienced any; except during the short period in which I used the Visible Speech characters with my pupils. Then they did make a few mistakes in spelling; but, taught with the ordinary characters on the German system, they rarely, if ever, make a slip. Therefore my comment is: avoid phonetic writing and no difficulties in spelling will make their appearance. It is the old rule, let speech, lip-reading, writing, reading from the written form, and language keep an equal balance and errors of all kinds will be avoided.

8. *Articulation as a Means of Instruction.*

Once more calling speech, speech, we see no other means and can advise no other. It is the only means by which the deaf can in truth be enabled to mix with their fellow-men, on any ground of equality, the only means by which they can acquire the power to earn their living in future without being seriously hindered from success in these days of competition. That such success is possible, let me venture to speak of one of my own pupils, a boy who became deaf from brain fever, at three years of age. This January he entered Trinity College, Dublin, passing a *viva voce* examination, and has since done equally well in his first junior Freshman's examinations, these being in Latin, Greek and mathematics, in the last of which he was particularly good. Yet this lad, now able to compete on equal terms with his hearing fellow-students, would, in all probability, have remained as dumb as when he first came to me, had he not been taught by speech and nothing but speech. I may add that he had only six years' special training from myself, then I placed him in the care of an ordinary tutor, under my own eye, for twelve months, after which he studied in his own country under a gentleman accustomed to prepare hearing youths for college.

9. *The Pre-Requisites of a Teacher of Articulation.*

In addition to the physical and mental qualities needed for becoming a teacher of hearing children, our student must be possessed of good eye-sight, good hearing, precise articulation and inexhaustible patience. He must be able to teach thoroughly not simply book-teaching, but teaching that is the result of knowledge that has become part of the teacher's own being, by diligent study, and which he has the faculty of imparting as thoroughly to others. This foundation laid, there must then be the necessary training in the technical knowledge required to make a thorough teacher of the deaf. This must include the anatomy of the ear and all the organs necessary to speech; the organs of vision and the nervous system; a knowledge of the proper formation of vocal sounds and the means of teaching these to the deaf; a personal acquaintance with deaf pupils during the teacher's course of training is also essential; and a careful study of the best modes of conveying a thorough knowledge of language to their minds.

The latter part of his training being briefly termed, experience will, of course, increase as his work goes on; but to expect a teacher to come directly from teaching hearing children to undertake the teaching of deaf ones, with no preliminary training, must be as heavy a tax on that teacher's strength and capacity as it is injurious, and harmful to the pupils committed to his unskilled instruction.

In short, if I may be allowed to suggest what would indeed be "the best method of promoting the cause of articulation teaching in America," it is this: To send one or two American gentlemen, knowing the customs and feelings of their nation, to Germany, there to be trained at Riehn, Schleswig, Wriezen or Director Rössler's school at Hildesheim—these being selected as among the very best now in Germany—and remaining there until they obtain the government certificate. This done, they could then return to America well able to grapple with the difficulties which are now so easy to see, but so difficult to surmount.

Such, it seems to me, would be the answers of the German system to the ques-

tions laid before us. If I seem to speak imperatively, let it be borne in mind that I now have the happy privilege of working with Mr. Kinsey, having his knowledge gained in the best German schools, added to my own experience of the failure of other plans and the success of these. What may appear imperiousness is only, in fact, the earnest desire of ourselves and our whole society for the best interests of the deaf.

We trust the day is fast approaching when the German or pure oral system will cease to claim either title, because in America, in England, in all the world, the deaf shall receive back their voices ; that speech and speech only shall be the means of communication between man and man, whether deaf or hearing.

How Best to Make Speech the Vernacular of our Pupils.

S. SCHOENTHEIL,
LONDON, ENGLAND.

This question seems to me a real *multum in parvo* ; for a simple, unassuming question though it appears, holding only the sixth place on the list of queries before us, it really embraces the whole range of the education of the deaf and dumb, or the all-involving problem, how to make the German method of instructing them a perfect success. Since the very fact of our asking that question clearly implies, that articulate speech is not always the vernacular of our pupils, and that, in spite of our efforts to that end, it remains a *pium desideratum*, I shall, like a sensible and conscientious physician, first apply myself to the task of making a correct diagnosis of the evil, and then attempt to prescribe for it, or tender my advice. .

Now, why, in general, is speech not the vernacular of our pupils? In the first instance, I think, because the vernacular, they of necessity acquired anterior to our teaching them our own, is considerably easier, not only to them, to whom sound is a *terra incognita*, and to create it must seem a useless effort, but also to us, the hearing, who not unfrequently resort to it for the sake of shortness, or from indolence.

In the second instance, because speech is a vernacular taught to our pupils in a manner not always perfect, and by teachers seldom quite adapted for their work, while the vernacular of natural signs is acquired by keen observation and ready imitation, both of which form the very nature of the juvenile in general, and of the deaf in particular. *Kein Begriff wohnt im Innern unserer Seele der nicht eingenogen durch das Thor der äusseren Sinne.* ("No clear conception dwells in the innermost of our mind, but that has entered through the gates of our outer senses,") says Goethe, the great explorer of the human heart ; and the eye is the widest of those "gates," while the magic power of imitation thrills through every fibre of the young.

Because, in the third instance, it is in human nature if not to turn against, at least to offer some opposition to whatever is made compulsory upon us, and the great mistake of exacting speech from the deaf in a peremptory manner is, I feel justified in saying, far too general. Because, in fine, the kind of speech taught to the deaf is often deservedly to be characterized, as the heart knowing nothing of the words which the mouth utters ; that is to say, a good deal is taught, less digested and nothing fit for use. To sum up, speech is the natural desire to impress upon others the thought or emotion which agitates our minds in the

easiest, shortest and most effectual manner, and the deaf, led instinctively by that consideration, speak in a manner which, in their uncultivated minds, seems to them all-sufficient for their little wants, simple thoughts and strong, or rather gross emotions. I should say, by way of paradox, *teaching the deaf to speak* is not certain to make *speech* their *vernacular*, but *teaching them our vernacular* is sure to make them *speak*. The deaf taught to speak and admittedly not using speech as their vernacular, strongly reminds me of the good old times, when our boys and girls used to groan under the burden of the grammatical rules they had to recite without being able to use a correct sentence in their mother-tongue, or of the times when the interesting doggerel of "Multiplication is vexation, etc.," was launched into being, because the poor little school-candidates had to swallow large pills composed of most unpalatable rules, which they could never digest, and which, therefore, would not enable them to do the smallest sum that suggested itself even in their own practical life. Those days are happily gone by, and the real educators now hold with the teachers of language who maintain, *die Sprache sprach ein guter Mann, was gehen mich seine Regeln an*; and as regards arithmetic, with the arithmetician who says, "the bigger the fool, the more indispensable the rule." The best way to make the deaf use speech as their vernacular to my mind is, therefore, not to "*teach them to speak*," but to *teach them our vernacular*. And when I am asked, how is this to be effected, I answer, cultivate lip-reading! This ever was, is and always will be my war-cry. so to speak. Get the keen eye of the deaf by uninterrupted practice to distinguish the rapid and minute movements in those outward organs by which human speech is moulded into being, get them habitually to hang upon your lips, and you have broken the spell which keeps the deaf tongue-tied; you have paved your way which, without fail, will lead you to the desired end of making speech the vernacular of the deaf.

Lip-reading, I said on another occasion, and I now repeat it, is the guardian angel by whom the deaf child is rescued from the dark prison-house, in which he is in danger of perishing from sheer want of food. It is the power of lip-reading which will convert his daily intercourse with others into a perennial spring of mental invigoration. Lip-reading is, in my opinion, the very backbone of the German system, the imperfect development of which cripples the whole body (the German system), and keeps it in a sickly condition certain to end in premature death, or in the state euphonically described, as the deaf not making speech their vernacular. With this end in view, I should insist on the following points:

Let the parents or guardians of the deaf and dumb be impressed with the importance of their treating the poor afflicted child as they would treat one in full possession of his faculties; that they never motion, but invariably speak to him, never mind their preaching to deaf ears. The power of habit and the force of the child's eye, capable of breaking through the bars of its mental prison, together with the mighty power of imitation and indefatigable activity so characteristic of the young, will soon prove to them that they have not been wasting their breath. They will be rewarded by the fact, that in time the child will understand almost all that is said without really knowing the meaning of any of the words used; that it will express its wants not by silent motioning, but by a kind of babbling in imitation of speech. And this may be looked upon as a guarantee that after a proper course of instruction by speech, his vernacular will be speech.

Here I need only remind my colleagues of the cases on record in the litera-

ture of the deaf and dumb, in which children have acquired articulate speech by no other means than by having been constantly, perseveringly and lovingly spoken to. A child thus prepared on entering school, no matter what the theoretical course of instruction pursued may be, ought to receive along with it a practical course of teaching him to speak by being constantly spoken to. Under such treatment, the deaf will almost in the very first stage of instruction, instead of resorting to natural signs, express their little wants not only to hearing people, but also to their fellow-sufferers by the few mono- or bi-syllables at their command. And not only will speech early establish itself as their vernacular, but, what is more, prevent signs from establishing themselves as such.

In the next stage of education, the only effectual means calculated to make speech the vernacular of the deaf, is to take care that every word, every expression and every phrase taught in the theoretical course of instruction should be made so clear to the mind of the pupil, that confusing it with any other is impossible and applying it very easy, and therefore quite certain. In this only those teachers will succeed who are, as we say in German, *Nicht nur berufen, sondern auch auserlesen*; that is, "not only duly appointed, but also truly qualified," who have a sound and clear knowledge of what they wish to impart to their pupils. *Lass etwas auf dich den rechten Eindruck machen, und du wirst gewiss den rechten Ausdruck finden, und hast du nur den rechten Ausdruck gefunden, so wirst du gewiss den rechten Eindruck machen.* ("If you only be thoroughly impressed with a thing, you will easily find the right expression for it, and having found the right expression, you are sure to create the right impression,") says the great German poet and philosopher Goethe.

The next point I should insist upon is, that the teacher should carefully and scrupulously avoid such things as gestures, significant glances and nods. By the use of them he defeats his own object; for the pupil being able to guess the meaning of the order given, or the information imparted, he little heeds the words conveying them, and such communications will serve not as an exercise in lip-reading, but as a practice in signing. In short, let the teacher, aiming at making speech the vernacular of the deaf, always speak, rarely write, never sign. Excellent lip-reading must then follow and consequent upon it, success all round. For, I maintain, the perfect infallible power of lip-reading — not "educated guess-work," as Prof. Bell calls it — will bring about an articulation, not labored and produced with effort accompanied by grimaces resulting from false processes of breathing, but one natural, easy and fluent. A correct, fluent articulation, in its turn, will cause the otherwise indolent deaf to take pleasure in speaking. His inclination to signs, the great drawback to which every honest teacher confesses and which in some, I am sorry to say, has even extinguished the *ignis fatuus* that has encouraged much effort to crown it with disappointment, will decrease and gradually disappear, while his inclination to use his vocal organs will as constantly increase; the use of the hands will become more rare, the use of the tongue more frequent, and, "practice makes perfect." The harshness of the voice will be softened, the disconnected utterances will become fluent speech, and the members of the family of the deaf as well as strangers, who formerly discouraged his speech, because the sound was "too painful" to them, will now encourage him and be glad to converse with him. By this means his store of words will increase, and his knowledge of idiomatic language will be enriched. The modulation, pathos and emphasis, which are manifested in normal speech, will not long escape his notice, — he will imitate the mode of ordinary speaking, at first feebly, then more and more perfectly

until, finally, the last stigma of his deafness — the *monotony* of his voice — vanishes to make room for modulated speech, increasing in degree with his increasing powers of entering into an appreciation of the spirit of language.

Easy, fluent, modulated speech fosters the bodily development ; sound health gives them the necessary pleasure in life and labor. His hours of instruction cease to be tedious and fatiguing, and are filled with lively interest. He learns with pleasure, because with ease, and willingly works, because with good results. In short, he is rescued. The world is no more to him, as before, a mere pantomime — he sees not only the *actions* around him, but knows and appreciates the *motives* that prompted them. He can think logically, speak intelligibly and interchange ideas with others ; his birth-right as a human being, his manhood is restored to him.

All that will then be necessary is not to render speaking repugnant to our pupils (1) by making it compulsory upon them ; (2) by constantly watching them with argus eyes to make sure of their keeping as stiff as a mummy, and not raising a finger even to give more emphasis to their words ; and (3) by straining our ear to detect the slightest fault in their articulation, so that our constant corrections reduce every one of their sentences or even words to veritable mince-meat. Let the deaf use a sign occasionally, let him now and then maltreat a sound or other ; speech being his vernacular, because the force of lip-reading is his power of hearing, we shall not long have occasion to correct him at all !

THE VARIOUS TOPICS DISCUSSED.

JAMES HOWARD,

HEAD MASTER OF YORKSHIRE INSTITUTION FOR THE DEAF AND DUMB,
DONCASTER, ENGLAND.

DEAR SIR : Pressure of business has hitherto prevented my expressing to you my regrets that I cannot avail myself of your kind invitation to attend your conference of articulation teachers. You will naturally suppose that I am deeply interested in your deliberations, and I most heartily wish your conference great and grand success. The program you have to go through, is a specially good one, and I trust each subject may be well thrashed out, and that we, on this side of the Atlantic, may receive the benefit from a published report of the proceedings.

With regard to (1) "First steps in articulation teaching," my practice is to, first of all, get the children to breathe freely and for a long time, by making them compete, while I hold my watch in my hand to show them who can blow the longest. This done, they are exercised in imitating all manner of facial expressions not to say contortions. Then they are put to the simple vowel sounds : *â* as in *fâr*, *ä* as in *nôr*, *ä* as in *Jûne*. Then a few of the easier consonants, combining them with the foregoing vowels, each day endeavoring to enlarge the number of sounds, and by degrees teaching all the vowels and consonants in the following order :

â as in *fâr*
ä as in *fat*
a as in *fame*
ô as in *nôr*
o as in *not*
ö as in *note*
û as in *Jûne*
u as in *but*

e as in *me* ; ü = eu as in *tune* ; î = âc ; e as in *her* — u, etc. We find the above number of vowels enough.

The consonants we teach in the following order, which we consider a very natural one :

f — v
s — z
sh — zh
th — th

t — d
 ch — j
 k — g
 l — r
 m — n
 p — b
 ng
 c = k
 x = ks
 c = s.

With the youngest children we use a candle and let them blow out the light for *p*, and also for *f* and *t*; for *z*, *zh*, *e*, we use a vibrator, made of deal about 18 inches long and $\frac{1}{4}$ inch thick in the thinnest part. The teacher puts one end between his teeth and the other end against the pupil's teeth. The vibration is felt very readily and is readily imitated, always, however, taking the *s* and *sh* as the foundation. Then for *k*, *g*, etc., we use a reflector, by means of which the child can see exactly what goes forward in the mouth. The teacher stands with his pupils before a large looking-glass, lights the gas jet and turns the reflector so that it shines a strong light into his own mouth, to which the child's attention is drawn through the looking-glass. The reflector is then turned to the child's mouth and its defects are pointed out. A little thing we call a manipulator, made of ivory or lance wood, about nine inches long, is also very useful for producing *ch*, *s*, *e*, etc. The child is asked to make the *t*-sound. The teacher then with the hooked end of the manipulator presses down the tip of the tongue and the *ch*-sound follows.

The children are not wearied with perpetually going through these sounds; they are taught to write; are taken into the garden, and about the house; various things are pointed out to them and the names written on a slate to be reproduced in the school-room. They are also required to go through little actions illustrative of verbs — run, skip, dance, write, read, etc., etc.; and, to save time, whilst the children are committing these words to memory in the class by speaking or by writing them over, the teacher takes them out one by one and goes over the lesson by articulation. As far as possible, the words given are within the power of the children's articulation. They are early taught *what*, *where*, *how*, *point to* and *touch*. Then the lesson becomes: What is that? Where is —? Touch —. Point to —. Who points to —? etc., etc.

I insist on my teachers being draughtsmen, and each one is compelled to illustrate his lesson or to ask some other teacher to do it for him, failing his own ability to do so.

Voice-training is a matter which cannot receive too much attention. By means of a baton, used similarly to conducting, we are able to get our pupils to "phrase" in reading, but not to the satisfactory extent I could wish.

Speech-reading does not seem so difficult a matter in the school-room as out in the world, which arises from the careless manner in which people speak and especially the majority of the classes from which our pupils are drawn. In Yorkshire we have further difficulties with the dialects. Failure after leaving school is too often accredited to the system of teaching rather than the slovenly manner of utterance of the speaking world. I incline to think that if our minister of education would direct that the finger-alphabet should be inserted in every school-book, that most children would learn it; and, failing to make

themselves understood by speech, on meeting a deaf person, would have the means at their finger-ends. The orally-trained deaf would usually reply orally, and thus stand a chance of keeping up a conversation longer than would otherwise be the case, and so go on improving daily in language.

Classification of the Deaf. — I am distinctly in favor of large schools, for the opportunities they give of classifying children of like ability. I make the ability the standard of classification, regardless of the time the pupil has been at school or whether born deaf or not.

Artificial Aids to Hearing. — I am only acquainted with the audiphone, which in my school I have not been able to use with any practical result. I always found those who could hear with it could hear equally well without it. A certain Dr. Taylor, of Nottingham, is at present experimenting on an old pupil of mine by means of galvanism, and has given the girl power to hear a bell ring and other sounds, much to her delight.

How Best to Make Speech the Vernacular. — This, I think, will prove a great difficulty, for while the little ones are learning to speak they must sign, or hold their peace, and where is the man cruel enough to forbid the little inquisitiveness which the deaf child expresses by signs? And once allowed to sign — on the same principle, that the great majority of mankind like to do that which is easiest and get through the world as easily as possible — they will sign wherever they find people to understand them; but, given sufficient time at school, it is possible to make the deaf prefer speech to any other mode of communication.

Difficulties Experienced. — I am not able to give an opinion at present on this question — the English language presents so many difficulties in this respect. I extract the following from a letter in the *Daily News* of, I think, sometime in November, 1877, by "J. M. D. Meiklejohn, late assistant commissioner of endowed schools commission for Scotland," on the difficulties of speaking children learning to read:

"To put the difficulties as shortly as possible, we may say that the child has to get over the following facts: (1) Out of the 26 letters, only 8 are true, fixed and permanent quantities; that is, are true both to eye and ear. (2) There are 45 distinct sounds in our spoken language; and there are 150 distinct symbols (simple and compound) to represent these 45 sounds. In other words, there are 150 servants to do the work of 45. (3) Of the 26 letters, 15 have acquired a habit of hiding themselves. They are written and printed; but the ear has no account of them; such as *w* in *wrong* and *gh* in *right*. (4) The vowel sounds are printed in many different ways; a long *o*, for example, has thirteen printed symbols to represent it. (5) Thirteen vowel sounds have 104 printed symbols attached to their service. (6) The single vowel *e* has 20 different functions; it only ought to have one. (7) There are at least 1,300 words in which the symbol and the sound are at variance, in which the word is not sounded as it is printed. (8) Of these 1,300, 800 are monosyllables, the commonest words, and supposed to be easier for children. (9) The whole language of country children lies within these words; and many agricultural laborers go from the cradle to the grave with a stock of no more than 500 words. * * * * The child sees a certain number of words like *thou*, *noun*, *house* and *mouth*, and he draws subconsciously the conclusion that *ou* will always sound so. But he very soon lights upon words like *your*, *four*, *mould*, *would* and *soon*, in which all his previous experience is not only quite upset, but he is forced to the conclusion that *ou* may have almost any sound whatever. If, then, he has happened to meet

the first case of *ou* nine times, and the other case of *ou* six times, his experience is really to be represented by $9 - 6 = 3$. This is the most favorable way of putting it. The real fact is, that the exceptions make themselves quite as important as the rule; that the child is not guided by rule at all; and that he learns each word separately, and as an individual."

On reading over No. 7 again I am afraid I have misunderstood the question and treated it more as difficulties in pronunciation. If what is meant is the difficulties deaf articulators find on account of bad spelling, etc., of those who communicate with them by writing, as in most cases of bad spelling there is a certain attempt at the sound of the word — in many cases very happy ones — this should be rather in their favor than against them, for I presume they would mentally articulate what they read, and would recognize the word intended from the method of articulating it. Thus *resev* would become *receive* in speaking it. I, however, recognize grave difficulties, as in the following sentence which came to me through one of my boys not long ago: "i shal breng my sun sum new cloas in the rase weak," meaning, "I shall bring my son some new clothes in the race week." Here we have the words *sun*, *sum* and *weak* conveying a direct idea on account of the spelling but altogether foreign to the sense intended to be conveyed. I have similar examples almost every day and in some cases whole letters have to be rewritten before we can put them into the hands of the children to whom they are sent. The only remedy for this is, I fear, the education of the mass of speaking people in spelling as English is at present known, and not the universal application of phonetics.

Articulation as a Means of Instruction. — Provided the children receive the necessary attention in the junior classes, it is undoubtedly far and away the best means, but the teacher requires to be full of vivacity and ingenuity in order to keep his class interested, and not to let a few good lip-readers do the whole work of the class. I find deaf-mutisms comparatively rare in the oral department here. Our aim is, above all things, to give language, and make the children think. They only remain with us an average of five years, so that we are compelled, in many cases, to leave the absolute giving of information until a late period of the school-term.

By this post I send you a specimen [omitted from lack of space] of the work of each articulation-class. The boy Kayley has been at school eight and a half years. By no means a sharp boy to start with, he has plodded up. He is the only boy in the school who has been so long, and we have only another who has been over seven years. In the same class with Kayley are children who have been four, five and six years, all doing equally well, and the same work.

Prerequisites of a Teacher. — Intelligence, sympathy, good mouth, clear pronunciation in good English, a lively disposition, power to draw, an acquaintance with the anatomy of the throat, and, I would add, a musical ear. If I might, I would also suggest willingness to be taught himself; some young men I have had and known, have had too much conceit for this last, much to their own detriment and certainly to that of the children.

Subjects 10, 11 and 12 belong exclusively to America, but are interesting to all teachers of the deaf.

In conclusion I must apologize for the hurried nature of this letter, and trust you will take it for what it is worth. In the hope of personally benefiting by your meeting, and again wishing you a harmonious and profitable gathering, I am, etc.

THE ORAL vs. THE SIGN-METHOD.

JOHN CARLIN,
NEW YORK.

[Mr. Carlin evidently labors under a misapprehension, if he believes that "the chief object of this convention was to renew the discussion of the propriety of the instruction of articulation in deaf-mute schools." But, considering the prominent position which Mr. Carlin occupies among the deaf-mutes of the country, and the deep interest which he has always evinced in our cause, the committee concluded to print his paper in full.]

Learning that the chief object of this convention is to renew the discussion of the propriety of the instruction of articulation in deaf-mute schools, I beg to present here my views on this matter, which have, for many years, been flitting in my head.

Much has been spoken at all the conventions of this class on the still-mooted question, Which is the surest and most practicable means of rendering the impressions of learned words and their grammatical arrangements in language indelible on the mute learner's intellectual organization — the system of articulation or that of sign-language? Standing long before that question, I studied the effects of the incessant use of signs on the pupil and graduate's mind; and when I was in the State House at Boston, whither I was requested by Dr. Howe, of the Blind Institution, to appear before the legislative committee, and express my opinions on the same question, I saw a little, lovely mute girl, reading a book before the admiring statesmen. That girl was Miss Hubbard who, in the course of time, became Mrs. A. Graham Bell, and her tutoress, who was with her at that time, was Miss Rogers, the instructress of Laura Bridgman. The facility and correctness of pronunciation, with which Miss Hubbard articulated, and the novelty of the scene, made a deep impression on me, since I learned that she was never allowed to practice dactylology and signs with her tutoress and friends. From that day I examined with due care the merits and demerits of the mode of articulation. My study of orthography and prosody, in certain English grammars, helped me in forming tolerably correct opinions in my mind, which will be found below; they being copied from some extracts of my controversy with the late Prof. J. R. Burnet, published in the *New York Evening Post*, in 1867. In answer to some remarks which he made, I wrote:

"As Mr. Burnet demands what is the practical value to deaf-mutes of such articulation as they can attain, the attention of all the opponents of articulation is respectfully called to the analogy which is presently to be introduced; and I trust prejudice will not be allowed to obtrude itself upon their minds while viewing the point. I ask: What is the practical value of an artificial leg to the man who has lost his leg? Why do crutches not answer as well as the artificial leg? The practical value of the artificial leg is its enabling him to walk with ease and

convenience ; hence its value is great ; but the crutches retard the locomotion of their wearer and disfigure his body, more particularly his shoulders, hence their company is not much courted. Now, by reason of the mechanical arrangement of the artificial leg, the man limps somewhat, and cannot be expected to run as fast as he wishes. So the deaf articulator, taught by the method now in vogue, speaks with perceptible inaccuracy of accent ; and, considering his want of the auricular sense to guide his pronunciation, it is impossible for him to equal the hearing in fluency and correctness. But, like the artificial leg proving useful and convenient to its owner in all his walks of life, our articulator, in communication with speaking persons in stores and elsewhere, finds speech often more convenient and useful than writing. His imperfect pronunciation may be taken for stuttering or some other lingual defect, and therefore meets more compassion than derision. 'There is some truth in the assertion, that deaf articulators cannot read on strangers' lips ; but if they follow the example of a French friend of mine, a born deaf articulator, who, being an artist, was my bosom friend while I sojourned at Paris, there is much reason to believe they will be comparatively successful in the attempt. I have often witnessed the manner in which he caught words on strange lips. Coming in contact with strangers, it was his habit — accidentally contracted — to turn his right or left ear to them at the same time he looked askance at their lips. They observing the listening posture of his head, naturally took him to be hard of hearing, and accordingly spoke loud. Loud speaking always renders the motions of the lips and tongue more conspicuous. In this way he was never at a loss to catch spoken words. As the artificial leg, however excellent in its workings, is by no means perfect, and, consequently, is susceptible of improvement by the inventive genius of man, so the articulating mode will be brought, even in fifty years hence, to perfection. To sum up. Speech is a necessity to deaf-mutes, and also semi-mutes — such as are capable of attaining it — in such circumstances as have been indicated ; its practicability is incalculable, and the necessity of improving the mode, at whatever cost, is earnestly urged for their good."

Mr. Burnet wrote :

" Mr. Carlin calls the sign-language a language that makes monkeys of deaf-mutes."

I answered :

" The subject of signs is one which cannot be well understood by the uninitiated, and for this reason it behooves me not to tax their patience with an unnecessary discussion of it ; but it seems proper to give them an insight into the effects this alluring language makes on poor deaf-mutes, both physically and intellectually. The signs, all know, are made by the arms and hands, gyrating in different forms to represent objects, action, etc. The quick movements of the arms and hands operate greatly on the muscles of the neck and face, and these muscles, in particular the platysma myoides, risorius and orbicular oris, together with nervous filaments, are brought into full and wild play, thus distorting the facial skin in grimaces strongly semblant to a monkey's. Besides, the larynx is also disturbed thereby, and, consequently, emits disagreeable croakings, always more disagreeable than the unnatural harrowing sounds which articulators often inadvertently make while speaking. Nothing but severe training can regulate those movements, and by this process many mutes have become fine sign-makers with undistorted faces."

Speaking and spelling on the fingers constantly always preserves the memory of

learned words and rules of grammar ; but the signs, by their excessive attractiveness, which does not arise from their beauty, but from their copiousness and extravagant freedom of action, exercise a powerful influence on the deaf-mute's mind. Everywhere, even in schools, they are played to the fullest — the words being neglected *in toto*. The impressions of signs in his memory, far outnumbering those of words, are always kept afresh, while the words, long in disuse, die, one after another, away. Nothing but constant application to finger-spelling, writing and reading can prevent the non-articulator retrograding to his former ignorance ; and the articulator, by his constant practice of his precious visible speech amid the hearing community, can preserve his honorable position which he has secured at the day of graduation.

IRREGULARITIES OF ENGLISH SPELLING.

J. H. BROWN,
BELLEVILLE, ONTARIO, CANADA.

The occasion which has brought us together here is one of especial interest. We are assembled as the teachers and advocates of a method that has many opponents as well as friends, feeling an honest pride in our conviction and theory ; to witness the progress that has been made by our students ; to exhibit the ripened fruits of the labors of some of our confreres ; to gather, I trust, many important lessons from the experience of those long in the work, and to prepare more thoroughly for our particular work at home. Although my position to-day is not wholly free from embarrassment, yet I am glad to be with you and to contribute my mite toward the success of this convention. The occasion furnishes me with an opportunity highly appreciated of exhibiting the deep interest I take and feel in the worthy cause of educating children who are deaf. I am well aware that there are many of my co-workers more capable of furnishing a few facts suitable for a paper upon orthographic irregularities, and as the subject is an extensive one, their conviction may be that "Fools rush in where angels fear to tread."

Well, sir, it is by mistakes that we learn, and if it were for no other reason than to gratify a personal desire to become better acquainted with my subject, I shall occupy a few moments of your time, trusting I do not speak to an unsympathetic audience, for if you take no interest in our work you would not be here. By your past as well as your present connection with institutions for the deaf ; by your relation to those that you teach ; by your desire to see the survival of the fittest methods for their instruction ; by your appreciation of the benefit that has already characterized the oral method, and by your sympathy for the deaf-mute generally ; the moulding of his character, the enlightenment of his intellect and the shaping of his destinies,—by all these motives you show an interest in our work.

The teacher of articulation, after a few years' experience, does not require to be told that our language possesses possibly the most ambiguous system of orthography of all the languages using the Roman letters. In treating this subject, we will take a superficial retrospective view of some of the earlier methods of writing by means of which we may in a measure account for a few of the anomalies which are characteristic of our English spelling.

It is supposed that the Phœnicians were the inventors of alphabetic writing. The Egyptians and the Babylonians had a system of hieroglyphics in which they represented sounds by figures and forms, but it was not alphabetic. They had a large number of ideographs, or signs for ideas, and both employed a

number of signs for the same sounds. Their system was clumsy and complicated, and we are told unfit for general use. The characters used by the Babylonians did not represent definite sounds of the human voice, in speaking. Their sounds had no definite value and were sometimes used for a complete syllable. The Egyptians went beyond this. They analyzed their syllables but never wrote exclusively by means of such analysis. Their system of writing was varied and mixed. Their phonetic symbols were either alphabetic or syllabic, and were continually being interchanged with the ideographic. It was in this stage that the Phœnicians took hold of Egyptian writing to disentangle it from so many contradictory principles. This was possibly the first attempt made to consummate the union of the written with the spoken words. It was, as has been well said: "To emancipate once for all the spirit of man from swaddling clothes of primitive symbolism and to allow it at length to have its full and free development by giving it an instrument worthy of it, perfect in respect to clearness, of elasticity, and of convenience for use."

The Greeks received their alphabet from the Phœnicians and the Romans from the Greeks. After the Norman conquest in England, there were a number of French words and phrases introduced in English with a different system of orthography. Shortly after this time there was an infusion of Latin and Greek derivatives, in a hap-hazard manner without any care to adapt them to our methods of spelling. Amid this confusion of elements in language, there does not appear to have been any attempt at a scientific representation of sounds by letters. Since the invasions of the Saxons into England, the greater part of the English language has been Saxon or rather Anglo-Saxon, but even this was not for a considerable length of time the written language of the people. At the bar Norman and Latin were the languages; in the field Norman was spoken; while at the court Saxon was used. It will be readily seen that, to give representation to a language which grew out of so many varied elements, by an alphabet originally intended for only one of them, would be an impossibility. With these various dialects and languages, which had fused into English, there were many sounds which the Latin tongue never possessed. Because of our insufficiency of letters for the phonetic representation of sound, there was adopted an ingenious method to overcome the difficulty. Orthographic expedients were resorted to; that is, a different letter or a different value of the same letter, or a combination of letters was employed to represent such elementary sounds as were unknown in the Latin language, and consequently unprovided for by its alphabet. It is not to be wondered at, when there were no printing-presses, that the system of writing was not philosophic. Language in these early periods was acquired almost entirely by the ear, and the probability is that very few, who at that time could read, were in the habit of using words they had only read. The consequence of this would be that writers differed very widely in their pronunciation, and as their spelling was intended to be phonetic, they differed just as extensively in their orthography. This is confirmed by the fact that manuscripts written about the time of the Norman conquest, or shortly afterward, reveal an orthographic confusion not to be found in other languages at that time. With the advent of Norman-French came new letters and new sounds, and not only these but it had different combinations to represent the same sounds. Then came the invention of printing (1471), possibly the most decisive epoch in the cause of spelling. With the introduction of the printing-press, at the time when Norman and Saxon were side by side in Eng-

land each striving for supremacy, it is not surprising to find that much confusion should be the result. The compositors were mostly from the continent and had little or no knowledge of the language. The result was that mistakes in spelling were of frequent occurrence, and in time were actually used as being correct. Their system of setting type was not as complete as that of more modern date, and it is said that letters were frequently dropped out or inserted into a word as the spacing required. Much of the irregularities may be traced to the capricious sway of Johnson's Dictionary. I think it was Johnson who wrote that "C had no determinate sound and it never ends a word."

Again, many of the beginnings of our orthographical anomalies originated in part with the slavish retention of symbols which had ceased to be pronounced in words, even before they were brought into the English language, while others have come through the gradual changes which occur in every language from time to time. We hold intercourse with the vast universe of mankind by means of writing or speaking. This communion of mind with mind is certainly greater, and I think more powerful, by means of the former than by the latter. Is it not, therefore, of the utmost importance that our alphabet, which forms the foundation of all literature, should be faultless and true? It is a lamentable fact that very few, even in our present day, can tell with any degree of certainty how to pronounce a word that may be given him in ordinary orthography, unless he should have heard it pronounced by others. (This fact was exemplified to me on several occasions during the time of the Zulu war. The pronunciation of Cetewayo, the Zulu king, was the subject of a good deal of controversy. The question could not be satisfactorily settled until we received the opinion of a philologist, of the leading paper in Canada. His decision proved none of us to be correct.)

The frequent misleading combination of letters to represent sounds in English alphabetic writing, is a characteristic not to be found in the spelling of any other living language, not even excepting the French. The object of all writing should be the representation of alphabetic sounds. In other words, the primary aim of orthography should be to analyze words into syllables and syllables into sounds; that each character should have a fixed sound which should not have more than one symbol to represent it. Much speculation exists regarding the primitive alphabet. Some assert that it was an invention, while others maintain that it was simply a discovery. The first letter, or mark, used for that purpose, whatever it may have been, worked out by the fertile brain of its author, was an invention, but the application of such to sounds which formed the elements of words, and the adaptation of these marks to ordinary conversation, was possibly the grandest fact in the history of the alphabet. The analyst of spoken language may have been one man, while the translator between the eye and ear may have been another.

In order to discover the true number of letters, we have to give representation to all our sounds. We shall, therefore, dwell more closely upon the alphabet. We have in all 33 sounds to be represented by 26 letters. Three of these letters (X, Q, C) are redundant, their phonetic value being represented by the remaining 23. The arrangement of the vowels with the consonants appears to possess much regularity and scientific construction. The vowels are found at regular intervals. First we have *A* followed by three consonants; *E* followed by another three; *I* with five consonants; *O* with a similar number; then *U* with another five consonants; or if we consider *W* and *Y* as vowels, each of them is followed

by a single consonant. Then, again, every letter in the alphabet, with the exceptions of *U* and *Q*, has the fashion of appearing silent, as *Balaam*, *lamb*, *scent*, *Wednesday*, *tame*, *cuff*, *gnaw*, *hour*, *business*, *anec*, *caf *, *mamma*, *autumn*, *trouble*, *receipt*, *purr*, *miss*, *often*, *build*, *seven*, *night*, *write*, *tic douloureux*, *say* and *buzz*. There are also many peculiarities resulting from a combination of different letters to represent one sound. The sound of our vowels disturb the common-sense of our children, and at almost every step their progress is impeded. They learn one thing in one word and it is contradicted in the next. It is evident that *oa* in the word *boat*, represents the single sound of *o* just as the single letter in "no." In the absence of a fixed sign for long *o*, we are forced to resort to the method of writing two letters. It would be a difficult thing to represent it by a single *o*, because once we make the addition of a consonant we immediately change the sound of the vowel, as "not."

We will now examine the five vowels and ascertain the many different ways of representing the sounds. Long *A* may be: (*ai*) *slain*, (*ay*) *stay*, (*eigh*) *eight*, (*ea*) *break*, (*ei*) *skain*, (*ey*) *they*, (*au*) *gaue*, (*ao*) *gaol*, (*ue*) *bouquet*, (*eig*) *teign*, (*ah*) *daklia*, (*aigh*) *straight*, and (*a*) *waking* — (13).

The Italian sound of *A* may be: (*au*) *awnt*, (*al*) *calm*, (*ea*) *heart*, and (*a*) *rather* — (4).

The broad sound of *A* may be represented by (*a*) *tall*, (*al*) *chalk*, (*au*) *Paul*, (*augh*) *caught*, (*ough*) *fought*, (*oa*) *broad*, (*aw*) *awl*, and (*awe*) *awe* — (8).

The long sound before *R* has: (*ai*) *fair*, (*ay*) *prayer* (*ea*) *pear*, (*ei*) *their*, (*e*) *there* — (5).

Long *E* may be: (*ee*) *feet*, (*ea*) *reap*, (*ei*) *receive*, (*eo*) *people*, (*uay*) *quay*, (*ey*) *key*, (*e*) *me*, (*i*) *police*, (*ie*) *piece* — (9).

The short sound may be: (*a*) *many*, (*ue*) *guess*, (*u*) *bury*, (*ie*) *friend*, (*eo*) *jeopardy*, (*ei*) *heifer*, (*ea*) *heather*, (*ay*) *says*, (*ai*) *against* and (*e*) *pet* — (10).

Long sound *I* is expressed by (*y*) *by*, (*eye*) *eye*, (*ais*) *aisle* (*uy*) *buy*, (*ye*) *dye*, (*ie*) *dier*, (*eigh*) *sleight*, (*igh*) *right*, and (*i*) *rite* — (9).

Short sound of *I* has: (*e*) *English*, (*ai*) *fountain*, (*ui*) *biscuit*, (*o*) *women*, (*y*) *pity*, and (*ey*) *money* — (6).

Long *O* may be represented by (*o*) and by (*oa*) *coat*, (*ow*) *show*, (*ou*) *four*, (*oe*) *foe*, (*oe*) *yeoman*, (*eau*) *bureau*, (*aut*) *hautboy*, (*ew*) *shew*, (*oo*) *floor* — (10).

The short sound may be represented by *O* and by (*ough*) *slaughter*, (*aw*) *paw*, (*a*) *watch*, (*ow*) *knowledge* — (5).

Long sound of *U* has eight servants with itself: (*ew*) *few*, (*eau*) *beauty*, (*ewe*) *ewe*, (*ue*) *sue*, (*ui*) *juice*, (*eu*) *feudal*, (*iew*) *view* and (*ie*) *adieu*; and the short sound may be represented by (*u*) *run*, (*ou*) *rough*, (*oo*) *flood*, (*o*) *some*, and (*oe*) *does*.

Taking the aggregate of the different representations for the five vowels, we find that no less than ninety-four methods are employed. Pupils have in all these cases to learn and memorize all the forms of spelling as co-incident with the same forms of sound. The greatest difficulty in the acquirement of the English language rests in its inconsistent orthography. Our pupils have to master, and to commit to memory word by word. There are no rules upon which we can rely, and if perchance one should be given, the exceptions are almost as numerous as the examples.

What would we think of a system of railway signals that meant a clear track and right of way one night, but upon another occasion signified danger; or how would we appreciate a system of mathematics, which made five equal to one quantity when before seven, but a different quantity when before three? These are examples of the inconsistencies that we must teach; these are the absurdities we have to overcome. We have not only a multiplicity of alphabetic combinations doing duty for one sound, but we have to add to their trouble in their attempts to master our orthographic anomalies, by giving different sounds to the same combinations of letters. Alas, how cruel the tricks of English spelling are! Take, for example, "ough;" observe how strangely inconsistent the spelling is for the pronunciation. A pupil that can believe in the spelling of

through, though, fought, cough, rough, plough hiccough, as being consistent representations of sound, will believe anything. Originally, spelling was intended to present an invariable representation of the same sound with the same symbol. This was the primary function of alphabetic writing. The sound which fell upon the ear was to picture to the mind a certain letter and no other. If a particular sound had been represented by one character in one place, but by another in a different place, the result of such in the earliest stages of our alphabet would have been fatal. But the language of our present literature, as it appears to us, reaches only to the eye, and it must be learned by the ear from the intercourse of our daily life. Fancy a person deducing from analogy the pronunciation of "sound" and "wound," "love" and "move," "door" and "poor," "arch" and "monarch," "lamp" and "swamp," "laughter" and "slaughter." Take an example of a word of one syllable, with the same radical vowel. In the word "we," the two letters as they are written give a phonetic representation. Prefix an "o" (owe), and the sound of "we" is not heard. Substitute an "e" for the "o" (ewe), and we have an entirely different sound. Again, place an "a" before the original word (awe), and we get still another sound; affixing a "t" at the end of our "we" and it is pronounced "wet." Examine now examples of dissyllables. We have "busy," "bury" and "surely," "putting" and "butting." We have, also, peculiarities in diagraphs; "ch" is apt to give you some trouble, as "chain," "chaise" and "chord;" "ph" may be put in the same category with "ch;" "gh" is ready to keep him company with its manifold servants, in "ghost," "cough," "hiccough" and "Lingham." "S" appears equally as misleading in "has," "sat," "sure" and "leisure;" "th" brings up the rear in "thin," "thyme" or "them." We learn in practice to readily recognize the distinction between "th" voiced and non-voiced, because we have acquired the pronunciation of every word in which it may be found, but how few there are outside of those who may have given the subject some attention that are aware of a difference in the pronunciation.

At best our language is but a transfer from the Latin, and the only original parts it possessed—that is, two symbols for "th"—were left out, not because the sounds which they represented had taken their departure, for they still remain. "C" may be pronounced like "k," "s," "sh," as in the words "can," "city," "gracious." "G" has two sounds as in "go" and "gentle." "Z" may be "z" in "zone," or "zh" as in "azure," "sh" may be "si," "ci," "ss," or "ti," as in "mansion," "precious," "pressure" and "caution."

Very frequently I have been asked why we retained letters in a word when they are not pronounced, probably never had been, and altogether likely never would be. This is a very difficult question to answer. Why should we have an "s" in "island," or an "hy" in "rhyme?" The former comes from "ealand" and the latter from "rime," both Anglo-Saxon roots. Why have we a "c" in "scent," a double "s" in "scissors?" Why "tongue" except from false analogy with "langue," instead of the Saxon "tung?" Why "could" instead of "coud?" Why "reason" instead of the old French "reson?" Why "parliament" instead of "parlement," "summer" instead of "sumor" or "sumer?" Why "cow" but "kine," "corn" but "kernel," "fancy" but "phantom?" If we substituted an "f" for the "ph" would we be less aware of its derivation? Why still retain the "b" in "thumb" and "limb?" Why, indeed, unless it be to preserve an effigy of an effete orthography? They come from the Anglo-

Saxon "lim" and "thuma." Why "receipt" but "deceit," "conceive" but "believe," "proceed" and "precede?" "Uncle" must be spelled with a "c," but "ankle" with a "k." Why retain the letter "b" in "debt?" The French do not use it, yet are they less ignorant than we as to its derivation?

If we can readily distinguish between the hominims "rite," "write," and "right," "wright," when spoken, would there be a greater hardship in making the same distinction when written? A-g-u-e spells a word of two syllables, but if we prefix "pl" we get "plague," a word of one syllable.

It would be a work of supererogation for me to add numberless examples of this nature. What I have desired to illustrate is that our present English spelling, through a combined number of causes, does not represent our present pronunciation, and in many cases a pronunciation we ever used in our language. The consequence of this is that we must necessarily experience difficulty in our work. But some say, if you write "program," "dialog," "hav," etc., it will completely destroy the history of our language. Well, what if it does? Language was not made for scholars only, and it must necessarily be in a state of change. If you examine the orthography of Bunyan, Spencer or Shakspeare, it will demonstrate to the most ignorant that wonderful changes have been made since that time. Milton wrote "sovrán," "stedfast" and "forgo." Spencer wrote "seemd," and in "Canterbury Tales" we find "ther," "lern," "ful" and "wondres." If either of these celebrities had to pass an examination before any of our school boards, according to our standard, they would be plucked in spelling. Voltaire said that "etymology was a science, in which the vowels are worth nothing and the consonants very little;" and so it would appear, especially with English. We will suppose that it did obscure the history of the word. How many of those who speak our language know, or care to know, the history of this or that word? The question is not, what is best for a few, but what is the most beneficial for the masses. The more we examine this subject the more we find that bad spelling is prevalent. In our city, I observed, the other day, amongst the signs, the following: "Pheaton for sale," "carriage makeing" and "cheap groceries;" yet I doubt whether we, as Canadians, are much worse spellers than other people.

Possibly, the nearest approach to a philosophical construction of a phonetic alphabet is that of Prof. A. Melville Bell's Visible Speech, yet I doubt whether it was the intention of the author to have it come into general use. I believe the system of Visible Speech has been the means of bringing the subject of articulation more prominently before teachers of the deaf; and though I do not consider it of absolute importance to convey speech to them, yet I deem it of vast utility that instructors of the oral method should possess a thorough knowledge of such a system. There can be no doubt that our unsystematic manner of representing spelling is a great difficulty in our teaching. This becomes more apparent with advanced pupils, who are constantly increasing their vocabulary of words. While our orthography remains as it is, this will not be made easier, but I trust that the language we use, will not long be kept in bondage by an orthography totally void of rule, method or system. And "yet there are people who honestly believe, there is something peculiarly sacred about the present orthography of the English tongue, who look upon the creation of type-setters as the crowning mercy to our race of an Allwise Providence, and actually shudder when a new spelling is employed, as if the fountains of the great deep were breaking up and the civilization of the world were threatened with a second deluge of barbarism."

ELEMENTARY VOICE-TRAINING.

PAUL BINNER,
MILWAUKEE, WIS.

The subject of voice-training is of the greatest importance to the teacher of articulation. It is auspicious to our cause that this subject has been deemed important enough to be brought before a convention of teachers of the deaf at such a comparatively early day in the history of articulation teaching in this country. Some of the foremost teachers, in Germany even, which may well be called the nursery of the oral method, regret at this late day, that the universal acknowledgment of the importance of voice-training is so much undervalued.

To the uninitiated it may seem as if we were venturing beyond our limits in speaking of voice-training in connection with the education of the deaf. For among hearing people the training of the voice is looked upon as a luxury, as a requisite only for the elocutionist or singer. But we as teachers know, that only the best is good enough for our children; that, in order to attain the highest grade of perfection in each individual case, we must employ the best means within our knowledge. He who realizes the great work in our charge, the difficulties with which we have to deal, can readily understand the necessity of employing the best possible means of perfecting the speech of our pupils. We have to deal with the most wonderful work of creation, the human organs of speech: a most intricate piece of machinery, which, neither in part nor in whole, can in a direct way be set in motion by us or regulated. It is not a piece of machinery, where we can touch a wheel here and a lever there. Only by indirect influence can we obtain command of the various parts and regulate their movements. The exercise of this indirect influence is accomplished by means of appropriate vocal gymnastics.

The organs of our pupils present the most varied stages of development. Some of our children have lost their hearing after they had acquired speech, and consequently have used them intelligently. Others have never heard, or have lost their hearing before they were able to speak. These two general classes present manifold sub-divisions, which in detail are infinite, for each pupil may represent a sub-division. But these manifold shades of difference are not relevant to our subject, for all organs of speech under our care need the same panacea — vocal gymnastics — in order to be brought to a satisfactory relative perfection,

The first factors in speech are the motive power, the air, and its generators, the lungs. Not only a development of the capacity of the lungs is necessary, but also the power of controlling the air in the lungs and trachea is essential. This is effected by the following breathing exercises:

Exercise I.

Position of the pupil : erect, arms by the side, heels in a line and together, feet turned equally outward at an angle of sixty degrees, the weight of the body resting on the ball of the foot. Inhale a deep breath, slowly and tranquilly, through the nostrils; care must be taken not to raise the shoulders. Exhale gently through the mouth. Repeat this ten or twelve times.

The object of giving this breathing exercise with arms at the side, is to call forth the action of the diaphragm. By doing this the pupil is hindered from using the upper part of the chest, the action of which tends to produce a muscular effort in the throat, which renders the voice extremely unpleasant, and calls forth an undue exertion, which makes fluent speech an impossibility. At the same time this exercise prepares the pupil for the succeeding gymnastics, as it acts in a quieting manner upon the whole system, reducing the excited pulsation of the heart and resting and strengthening the lungs, all of which is of importance to the salutary effects of these gymnastics. As these exercises are to take place at the beginning of school hours, and pupils come in with the action of pulse and lungs more or less accelerated by the excitement incident to coming from the play-ground or the walk to school, the necessity of this exercise as a preparatory one will be obvious.

Exercise II.

Position of the arms and body as before. A full breath is taken and retained, then discharged through the mouth. The breath being held by closing the glottis, a proper articulation of the vocal bands is effected—one of the principal requisites in phonation. Furthermore, by this action, the vocal cords are strengthened, and their adaptability to the various positions necessary is greatly augmented. But the effect of this exercise is also beneficial to the diaphragm and the expiratory muscles of the thorax, making a proper, and on the part of our pupils, voluntary action of these muscles and especially of the diaphragm possible.

This exercise should be practiced very carefully in the beginning; it should not be repeated too often, and the breath not be held too long. Ten seconds at first is sufficient, and this may be gradually increased until the pupils have become able to hold the breath about thirty or forty seconds. When the pupils are able to do this, they may regulate the exercise according to their physical strength. All undue action of the muscles of the throat or neck, which is indicated by the swelling of the veins on the side of the neck, must be avoided. Having thus, by means of these silent exercises, acted upon the generators of the voice, we proceed to the organs of articulation.

Exercise III.

This consists in moving the lower jaw vigorously up and down. This may be done 50 or 60 times. The motion is performed with the point of the tongue upward, in position for sounding the letter *t* or *l*. I mention the *t* first, because being easier for the beginner than the *l*, is generally taught first and, therefore, sooner available for this exercise. As soon as the pupils can produce the *l* properly, pains should be taken to have this position observed during the exercise, as it is more conducive to a depression of the back part of the tongue, which is equivalent to an enlargement of the cavity of the mouth, the principal

requisite for the formation of pure tone. Furthermore, the position of the tongue in / assists not only in pushing the lower jaw downward, but also forward, which latter motion assists the depression of the back part of the tongue. It is also evident, that this exercise enhances the power and flexibility of the external as well as the internal muscles of the mouth. But another important factor in the mechanism of speech is hereby exercised, the palato-pharyngeal muscle, which raises the soft-palate and thus in an opposite direction unites with the action of the tongue in shaping the cavity of the mouth for the proper production of tone. The functions of this muscle do not confine themselves to the soft-palate only, but they extend to the vocal cords, and even in the action of the diaphragm the influence of this muscle is clearly perceptible.

The good effect this exercise has on the organs of speech is so valuable and so striking, that the teacher will gladly make use of it as often as possible during the regular work of the day. All speaking and reading exercises during the first months should be preceded by this jaw-movement. After the pupils have become familiar with the exercise, the indistinct pronunciation, or the imperfect formation of tone, can at any time be improved by drawing the attention of the pupil to this action of the lower jaw. This can be done by the teacher by pointing to his own. The children will soon learn to understand this sign, and continued practice will eventually become a fixed habit, gradually paving the way for clearer and better speech.

Exercise IV.

We have now finished the silent exercises, but before passing over to tone and articulation a preparatory exercise is introduced. We proceed to tune, so to speak, our instrument. The tuner is found in the sound of *h*. From this whispered sound of *h*, which is simply an emission of air through the glottis, which here takes a position intermediate to the more widened glottis in breathing and that of the more contracted glottis in producing tone, we obtain that position in which the simple or fundamental consonants *h, p, t, k, f, s, th, sh, ch* are formed. From these fundamental sounds we derive *b, d, g, v, z, zh, j*. This exercise, beginning with shaping the sound of *h* into the whispered *hü*, can be made still more useful and varied by going successively through the combinations of *hü, ho, hoo, he, hi*, practicing each twelve to fifteen times.

Deaf-mutes often have difficulty in producing the *h*-sound; this intermediate position of the vocal bands appears to require too delicate an adjustment for their untrained organs. This exercise trains the vocal cords to assume and hold this position; furthermore, the changes on the vowels are an excellent drill for the muscles of the lips.

This exercise should be one of the first to which the pupil is introduced. The teacher can make it interesting to the smallest child by means of bits of paper to be blown off the hand, or by using slips of paper (heavy writing paper will answer the purpose the best), six to eight inches long and about one and a half inches wide. These are held before the mouth, and the motion of the paper, varying with the change of the vowel, will attract the attention of the child.

Exercise V.

From this drill we pass to the full use of the voice. It consists of the syllables *hü, ho, he, ha, hi, hoo*, and is conducted in the following manner: Each syllable is pronounced three times in one breath, thus: *hü, hü, hü*. This

is to be repeated twice. After practicing all the syllables in this way we begin again at the first, and pronounce the first three in one breath, *hă, ho, he*; then four syllables in one breath four times, five in one breath five times, and finally all six in one breath six times.

The mechanical action called forth by this exercise is in conformity with the physiology of the organs of speech in their relation to the elementary sounds; for, in producing the *h*-sound, we have, as mentioned before, the vocal bands in the fundamental position for the consonants. From this position the cords, by means of the vowels, are now brought into closer contact, thus training the glottis in all the primary positions necessary for the production of speech. In this way, the great difficulty which deaf-mutes have to contend with, namely, the inability of combining the consonantal and vowel sounds fluently, is met and overcome. The drill for the lips and the other parts of the mouth, called forth by the various vowels, is also highly beneficial. But the prime object of this exercise is to train the vocal bands in this intermediate position which they occupy in the production of the fundamental consonants.

The next three exercises, taken from the work of Prof. Lewis B. Monroe, embody the entire action of the organs of speech.

Exercise VI.

This is upon the fundamental vowel sounds, *ä, e, oo*. A triangle is drawn upon the black-board, and at each angle a letter, representing the sound, is placed. The teacher points to the letters in rapid succession, so that the pupils are led to pronounce them continuously, with one breath, without a pause. Having gone round three or four times in one direction, a stop is made, a fresh breath taken, and the vowels are pronounced in the opposite direction. Continuing in this way the triangle will give us six changes, namely: *ä, e, oo; ä, oo, e; e, ä, oo; e, oo, ä; oo, ä, e; oo, e, ä*. This exercise brings the lips and jaws into full play, and the continuity of breath called forth trains the organs to a more fluent pronunciation of polysyllables and sentences.

Exercise VII.

A triangle, with the consonants *k, p, t* placed at the angles, presents an excellent drill for the lips, tongue and soft-palate. This exercise is conducted in the same manner as the previous one, and furnishes the same number of changes.

Exercise VIII.

The syllables *ip, ik, it* may now be placed at the angles and drilled in the same manner as before. The combination of vowel and consonant, as well as the pronunciation of *i* itself, will at first seem difficult. But continued practice will result in the clear and concise pronunciation of consonantal sounds; and the *i*-sound, so perplexing to many pupils, can in this manner be surely obtained.

Exercise IX.

In the fourth exercise, the sound of *h* has been called the tuner for the fundamental consonants; in this exercise we introduce the tuner for the vowel sounds. It is the sound of *e* as in *met*. This sound, produced in a short, sharp manner, causes the vocal bands to vibrate to their full extent; in other words, the chest-

register of the voice is called into action, which is the opposite to the falsetto voice, where only the edges of the vocal bands vibrate. Generally, the falsetto voice is used in high tones only. But also deep tones may be produced in the same manner. Hearing people make use of the falsetto in singing notes above their chest-register, the unpleasant character of the deeper notes is too apparent to them to be made use of. The falsetto voice requires but little exertion; therefore, when hearing people use it in speaking, it is always a sign of debility, either physical or intellectual, for in sickness or in affectation the superficial action of the vocal cords is exercised. With the deaf it is different. They cannot regulate their voice by means of the ear; furthermore, deaf children, when they use their organs of speech, are apt to use them only in the extremer positions, either in screaming or in other harsh and loud tones, called forth by passion, or by excitement; if in a passive state of mind, they produce sound with the least possible exertion, and thus call forth the falsetto action of the vocal cords.

Another illegitimate action often met in deaf-mutes is the depression of the epiglottis, causing the voice to sound muffled, and rendering a clear and correct enunciation of the vowels impossible. Producing the *e*-sound, as mentioned, brings the vocal cords into the position for chest-tone, and the shape of the mouth necessary for *e* prevents the depression of the epiglottis. This valuable exercise is multiplied by the successive practice on the vowels *a*, *o*, *i*. The successive expulsion of the vowels may continue as long as the breath holds out. The sounds must not be allowed to run together, they must be kept perfectly distinct. One repetition of this exercise seems sufficient, as it is somewhat tiring.

After thus calling forth the quick and decisive action of the vocal cords we find in

Exercise X.

the proper drill for the organs in *sustaining* tone. A fault very common among deaf-mutes is the inability to prolong the vowel sound, or to speak it with sufficient volume of tone. There is no body to the vowel. This is often caused by negligence, often by the incapacity of the cords to hold long enough the more contracted position necessary for the vowel tone. A remedy is found in giving a prolonged sound of the vowel. It is expedient to use the three fundamental vowels first, *a*, *e*, *oo*, to which are added *i*, *o*, *a*, *a*, in which the form of the lips undergoes very distinct changes. The lip-action produced is a valuable addition to the exercise, as the lips of deaf-mutes are generally found to be very stiff, and their free action is essential to good enunciation. Each vowel may be pronounced three times in a prolonged, full tone. The teacher can regulate the length of the tone by appropriate motions of the arm and hand. A sweeping motion of the right arm, outward, with open hand, will indicate the strong character of the tone. The motion of the arm having reached its terminus, the still open hand suggests the continuation of the sound, and closing the hand indicates discontinuation of sound.

The drill on the short sounds, in Exercise IX., can also be aided in a similar way by short, quick motions of the hand downward.

Exercise XI.

For enhancing the rapidity and skill in the use of the organs of speech, the following will prove serviceable: Place the vowels on the black-board. Begin

by placing the consonant *b* before the vowels, and in succession pronounce them together with the consonant, producing, for instance, babababa, bobobobo, etc. Each day another consonant is used.

Exercise XII.

The final exercise deals with the most difficult action for lips and tongue — the combination of consonants. Beginning with combinations composed of fundamental consonants, or atonics, such as are found in the beginning and ending of words, for instance, *st, ks, ft, sk, (sc), sp, ps*, etc., the combinations of the subtonics are then added, until the exercise embodies all the principal combinations.

This finishes the special vocal gymnastics. The exercises should be introduced at the very beginning. The first four can be practiced on the first day the child comes to school. The succeeding ones are to be introduced as soon as the pupil can form the necessary sounds. Analogous to the introduction of consonantal sounds by means of the *h*, is the sound of *e* in teaching the vowels. It may not always be possible to obtain the *e*-sound as first vowel sound; the *a* is easier taught. But from the *a* the *e* can then be readily formed. These vocal gymnastics must be the daily exercise for the first two years. The hour — for they occupy that length of time — cannot be spent in a more profitable way. The practical application of these exercises and their continuance is found in the phonetic spelling, which can be introduced as soon as the pupils are taught the first word.

Calisthenics, selected with a view to developing and strengthening the chest and lungs, are not to be overlooked. They are a most valuable ally, and as such should have their regular place assigned in the day's work.

In my opinion, the first two years should be employed in giving the child speech, nothing more. Our prime object must be, speech for the dumb; our next aim to fit our pupils for practical life by means of a common-school education. After two years of thorough work in speaking and lip-reading, in connection with which writing is taught, the teacher has opened the avenues by which knowledge can be imparted to the child. A solid ground-work exists then, upon which towers and turrets, pillars and cornices may be reared; but all must be joined and held by the main wall, which is the continuation proper of the foundation. Leaving metaphor aside, the aim of all our instruction must be, to give speech to the dumb.

LINE-WRITING AND KINDERGARTEN.

GERTRUDE BURTON,

TEACHER OF PROF. A. GRAHAM BELL'S PRIVATE SCHOOL FOR VERY YOUNG
DEAF CHILDREN IN WASHINGTON, D. C.

We believe that, in the education of the deaf, it would be better if speech, instead of being consciously *acquired* as an *accomplishment*, could be developed naturally, as much as possible, in very early childhood. Our aim, therefore, has been to discover a system that would be adapted to the needs of deaf children before the regular school-age.

We have had five children in our school. Two of the children were hearing children (5 years and 3½ years old); two were congenitally deaf (4 years and 6 years old); and one child (6 years old) had been deaf for about a year. Only two children have been in regular attendance; one being the child four years old, congenitally deaf; and the other being the child six years old, who had become deaf through recent illness.

In talking over what had been shown by the first year of this experiment, Prof. Bell thought it would be a good plan to answer a few direct questions, such as the following:

I. Are Words More Quickly Learned in Line-Writing than in Ordinary Writing?

We have reason to believe that words in line-writing are more easily learned than words in ordinary script, or print, because the picture formed with these phonetic characters is a much clearer picture, — the lines being fewer, simpler, and thus the picture, as a whole, being of much more distinct and *emphatic* character.

It is not until very recently that we have had a really fair opportunity for comparison, as line-writing has been used, almost exclusively, throughout the entire year. Within the last three weeks, however, our eldest pupil has translated the sentences in the reading-book from line-writing into ordinary script form. The sentences were written exactly opposite to each other. The child had a very slight knowledge of script letters before entering the school. The words which we have taught her in script, however, have been taught as *wholes*, the same as in line-writing. Although this pupil was somewhat familiar with about a dozen words, in ordinary writing, such as "cat," "dog," "ox," "fox," etc., we have found that words which have been totally unfamiliar to her, were harder for her to learn as *pictures*, in ordinary writing, than any word she had ever tried to learn in line-writing.

The fact that, in line-writing, the same sounds are invariably represented by the same signs, has been a very great and direct help in remembering words. This association of words, by their resemblance in form, and so, of course, by their similarities of sound, is of such real interest and importance, that it will be referred to later in a more detailed description of some of our practical exercises.

Judging of the progress, in a general way, our pupil has learned to read sentences in ordinary writing with wonderful rapidity; showing that her constant observation of form in line-writing has given her a quick and useful perception of outlines. She now reads quite a large number of sentences as fluently and understandingly as any adult person. It is a special pleasure to make this statement, for it tells that line-writing, instead of being an interference or hindrance in the way of learning to read by the usual forms, has been a very positive help. Thus, to this deaf child, line-writing has been a means of making speech clear, just as hearing is a means of making speech clear to a hearing child. Ordinary writing has thus fallen into its perfectly truthful place, as a representative of speech which, although corresponding in meaning and interpretation, does not by any means exactly correspond to the outward form or expression of speech. Ordinary writing cannot be depended upon as a thoroughly clear and practical means to a correct development of speech.

II. Do Children Learn to Write in Line-Writing More Quickly than in Ordinary Writing?

Whatever is clear and simple makes a vivid impression upon the mind. It follows, as a natural consequence, that if words in line-writing are more easily remembered by the children, they will also be more easily written than words which are less simple in form. This has been proved by the children often rushing to the board spontaneously, to write words upon which there had not been any special training. Before the end of the first week, the little boy, four years old, tried to write the word *sit*. (Fig. I.)

FIG. I.



FIG. II.

He remembered the prominent bounding lines, but left off the small vocal sound (Fig. II.), thus showing, however, that the important and characteristic outlines of the word were clearly impressed. Before two weeks had passed, the same child wrote his name, "George" (Fig. III.), and the word "horse" (Fig. IV.) correctly, without having had any special lessons in writing. Not long ago,

FIG. III.



FIG. IV.

another pupil tried of her own accord to write the sentence, "Shut your eyes." She wrote it as shown by Fig. V. ;

FIG. V.



the correct form is as shown by Fig. VI.

FIG. VI.



It will be seen that the word "shut" was thoroughly remembered. The word "your" fairly written, one of the sounds being a little too high in relation to the other characters. The word "eyes" was correctly written, except that the last character was not shaded. All the words which the children have learned to write have certainly been written more quickly and more correctly than words in ordinary script by children of the same age and with the same amount of training.

Whatever special instruction has been given in writing, has been chiefly by means of tracing. At the very first we had tracing slates. The children traced a picture of some animal, etc., and then wrote the name of the animal several times under the picture. We afterward had copy-books conveniently bound with tracing paper, and also allowing occasional opportunities for writing without the help of tracing. We wrote *sentences* in the copy-books almost entirely.

III. Does Line-Writing Facilitate Speech-Reading?

It facilitates speech-reading because it always remains an invariably true picture of sound. Any words which have the same general character in line-writing, will have the same general character in speech. Therefore, *similar pictures* in line-writing correspond to *similar pictures* in speech.

I found out recently that one of the pupils confused the words *bread* and *plate* when he tried to read them from my mouth. I discovered after *writing* the words several times, that the reason the child confused these words was, because they really looked alike when spoken. The deaf child must necessarily depend upon the forms of words as pictured by the movements of the mouth. (Fig. VII.)

FIG. VII.



It will be observed that line-writing shows that the first and last characters of both these words (the bounding lines of the picture) are the same in form. These characters correspond to the first and last actions of the mouth made in speaking the words. The difference in shading merely denotes the difference in voice-power. It does not alter the outlines of the word-picture any more than voice alters the picture presented to the child in speech.

What has been accomplished will be better shown in answering the next questions.

IV. Does Line-Writing Facilitate the Recovery of Speech?

A child, who has once heard and spoken, will, of course, find it much harder to learn the separate elements of sound than a congenitally deaf child. This is simply because a child, who has once spoken, has not been accustomed to distinct, meaningless elementary sounds, and, therefore, the method is a forced and artificial one. But a congenitally deaf child, who has no personal idea of spoken language, will find it comparatively easy to make a simple elementary sound quite detached from any particular meaning. It was, consequently, better and more natural, in the case of the child who had once heard, to begin with words as wholes, and, gradually, as in time the word-pictures become familiar, to split up the words into their parts and elements. The great use of line-writing, with its invariable symbols, at once becomes apparent.

Our pupil knew the print-letters of the ordinary English alphabet, but these were not of any direct use for speech, nor as means to sound, until they were

converted into true sound-pictures. We, therefore, had cards with the printed letters on one side and their sound-pictures in line-writing on the other side. Simply to show how the letters were, in this way, turned into practical purposes, we were able to teach the child the name of one of her little playmates and still preserve the real and original *sound-value* of the letters.

FIG. VIII.



We made a full collection of simple words, repeating the same sounds, by combining the vowel and consonantal sounds according to certain rules. Out of all these words we selected those that could be well and clearly illustrated. Drawings illustrating the desired words were made upon small cards, and the cards presented to the child. The child, recognizing the picture, would generally give the right name at once, and if she did not, it was a very easy matter for her, having the picture as a definite suggestion, to find out the name we wanted. In case she had not remembered, or had not known the word we wished to use, the card would simply have been laid aside.

We then took a number of the cards, and overlapping them so that only the written portions or names could be seen, we had the pupil read all the words in quick succession, as for example, Fig. IX. By adding a new consonantal sound we had Figs. X. and XI.:

The advantage of this overlapping system for ready comparison will be easily seen by all. By this means, if the pupil forgot any one of the words, she could recall it by going over the whole list very rapidly, and thus, unconsciously becoming familiar with elementary sounds, she would make the same addition or combination she had been making throughout, until she suddenly reproduced the lost word.

We tried several other ways of recalling and preserving speech by means of pictures. We had a scrap-book. The remarks made by the child as the pictures were being pasted, were jotted down under the pictures, and the child was made to read her own speech. Once or twice we had quite a little story in this way. There is a certain free, spontaneous sense about this method of having a child make his own lesson that, for variety, may prove a very great delight.

We had pretty pictures cut out of children's old magazines, and pasted separately on large cards, which we used for the same purpose as the scrap-book—that is, writing down what the child would say about the picture, and then having her read what she had said. Our reading-book (to which I referred at the

FIG. IX.

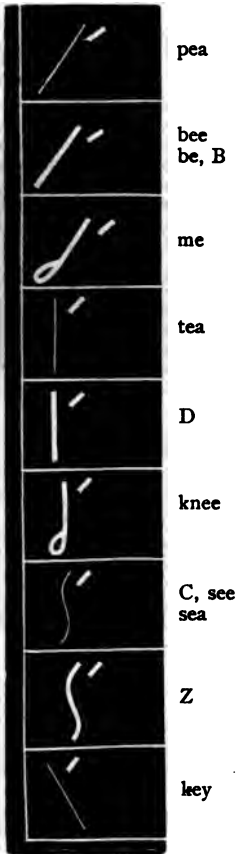


FIG. X.

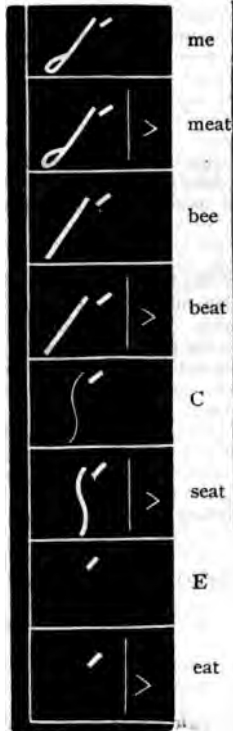
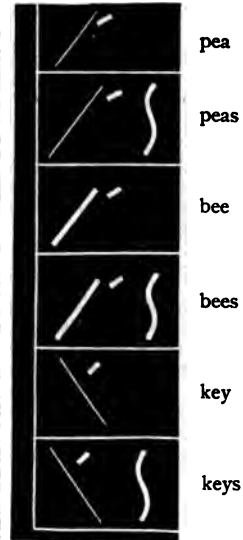


FIG. XI.



beginning of this paper) was entirely composed of sentences which had formed the language in the school-room. In fact, it was only the repetition and preservation of what had been said and done in daily exercises.

Sentence-making was a most valuable exercise. I spoke a sentence, such as "Please put a fish in the dish," "Put the key in the door," "Open the door," etc. The children would read the sentence from my mouth. They then selected cards from a pile of mixed words, and placing the cards on the table in proper form they combined the separate words as they remembered them to have

occurred in my spoken sentence; then having reproduced the sentence correctly as a whole, they read it aloud. This was a most thorough exercise, both for speech-reading and the construction of language.

All these exercises have shown that line-writing has been of great help in offering most excellent opportunities for the comparison and association of words. Words that look alike are associated unconsciously by their resemblance; while differences, of whatever sort, are so easily pointed out to pupils that mistakes are soon corrected. It is an admirable fact that in line-writing, even confusion has its beauty and advantages. Words that are liable to be confused in line-writing are words that are liable to be confused in speech, so that if words are confused because they look alike it is also because they sound alike. Therefore, in line-writing all confusion arising from resemblance increases the familiarity with sound.

V. Does Line-Writing Facilitate the Acquisition of Speech?

It facilitates the acquisition of speech, especially, because it is a means of making speech *clearly visible*. Our congenitally deaf pupil depended much more upon line-writing than the pupil who was not born deaf. If he could not remember a word as represented by my speech, he would often recall it instantly when shown to him in line-writing. And why? Simply because line-writing is speech made clear and definite.

Line-writing should be constantly used, as much as possible, in connection with speech. There is only one difficulty, and that is that if the sense of sight is depended upon entirely, we keep the eyes busy in two ways at once, — looking at the writing and watching the mouth. Prof. Bell has obviated this difficulty by introducing a manual alphabet. The principle is a very simple one. It is merely writing on the hand by touching the sound-elements. Definite places are chosen on the fingers and hands for the same phonetic characters that are used in line-writing. A glove marked with the characters is used at first. Thus, while speaking to the child, all sounds are made definite by touching the various symbols on his hand as fast as the sounds are being uttered. This method, by introducing the sense of touch, allows full freedom to the eyes, enabling them to watch the mouth of the speaker without interruption.

There is a very direct advantage in using line-writing to facilitate the acquisition of speech, when we realize that every word in line-writing is a simple combination of distinctly clear and invariable elements. Thus every word is a positive gain in speech, for it can be broken up into parts, and these combined in many ways, and still the original parts will always have the same sounds. Our little pupil, four years old, was able to combine the few consonantal and vowel sounds which he knew, without difficulty. I taught him to combine these simply by separating the sounds of a known word, and placing them in connection with other known sounds.

It seems hardly necessary to suggest that in the acquisition of speech, even more than in the recovery of speech, there is an immense advantage in being able, by the help of line-writing, to have such a close association between similarities of form and similarities of sound.

VI. Are Words More Quickly Written in Line-Writing than in Ordinary Writing?

It has been proved, by actual test (with the perfectly simple and familiar lan-

guage used in the school), that I am able to write several more sentences in line-writing, in a minute, than in ordinary writing, and with much less effort and fatigue.

The Applications of Kindergarten to the Instruction of Deaf Children.

As one's daily surroundings have so much to do in moulding effects and producing results, it seems suitable that I should say a few words about our school-rooms. They had morning and afternoon sunshine. There was a large bow-window, with a cosy seat running around its curve. This window overlooked a garden which, in the spring, burst into a wonder of bright colors and sweet smells. It will always be a pleasure to recall the memory of those rooms with the air of the nursery, and a touch of home; the walls, with their pictures of happy children, the open fire-place, the pretty little chairs and tables, the curtained shelves full of kindergarten materials, the other toys, the horse with real hair, the steam-cars, the beautiful doll with her own chair and crib, and trunk full of clothes. We had a *museum of common things* — a collection of as many everyday, ordinary things as we thought of. These were put into bottles and labelled on one side in line-writing, and on the other side of the bottle in script.

We had large white-boards. They were thick plates of ground glass, backed by white cotton cloth, the whole being simply and tastefully framed. These boards were jointly invented by Prof. Bell and myself. We were able to use charcoal instead of chalk, which is certainly more healthful and agreeable for such constant use. The benefit to the eyes, thus obtained, by black on white instead of white on black, or as it generally becomes, white on gray, is acknowledged by the best oculists and educators. I must not omit to state that white-boards, when compared to black-boards, have a very great æsthetic value, as they give clean, light, cheerful effects to the room.

The chief object of this school has been the development of speech. Therefore, all kindergarten methods have been made subservient to that end. We have had kindergarten principles in our play, in our school-government, and in our general work.

In the pleasant little house which we occupied there was a regular kindergarten for hearing children on the first floor, while we had our special school for deaf children on the second floor. The deaf children went down stairs for all the kindergarten games and for most of the kindergarten occupations. This plan has worked so admirably in giving a thoroughly natural companionship among hearing children, that it must be acknowledged as a very great success.

At first the deaf children were shy about taking prominent parts in the games, but even on the first day my journal tells us that a little boy, congenitally deaf, "entered with real enjoyment into the spirit of the kindergarten games with the hearing children, and actually tried to sing!" Gradually as our stock of words increased, some of the games were intelligently explained and understood, and now these little deaf children enter so heartily into the pretty games, that when visitors come I have frequently been asked the convincing question, "Which are the deaf children?"

The hearing children and the deaf children, thus thrown together in their daily interests and enthusiasms, have learned to feel a genuine sense of companionship. These little ones have proved that in the free, generous, loving fellowship of childhood all difficulties are surmounted, all differences are forgotten.

In their spontaneous, happy way these little hearing children have talked to the little deaf children, and the deaf children have understood enough to make them want to understand still more, and—to talk also!

In our special work up-stairs, we began by playing, and have been playing ever since, as much and as hard as we could. At first, everything was labelled—the doors, the walls, the windows, the tables, the chairs, and the playthings. In order to give the children the idea that these pictures, or written words, were the names of the objects upon which they were pasted, we established what we called “the shop-system.” We had racks filled with cards. On these cards were written the names of the objects. When the horse was wanted, we would lead the horse to the card-rack, and hunt the card which bore the same word-picture as the label on the horse. Having found it, I would speak the word *horse*, place the child’s hand at my throat, and after the child had made an effort to reproduce the word in speech, the card was handed to me, and the child received the horse. In these first days, it was not so much *what* was said, nor *how* it was said, that we felt to be of importance. Our chief aim was to establish the *idea* of speech. By and by, as the words became familiar, we did not need the cards with their written symbols. But instead of hunting a card, the children come to me directly and speak the words.

In the beginning, we talked and wrote to the children constantly, saying anything and everything, and having them try to speak only the important words or nouns, the names of their playthings, just as we naturally do with hearing children who are learning to talk. We introduced active verbs almost immediately, by simple class-exercises. As fast as new words were suggested and known, they were combined into sentences, and, after a sufficient drill in class-exercises, these sentences were transferred to the reading-book.

I will mention some exercises which were directly founded on kindergarten ideas. The most interesting, perhaps, are those by which the colors and the use of the senses have been taught, and those which have aroused an appreciation of quality and number.

Squares of distinctly colored paper were lightly pasted on the white-board. Plenty of space was allowed between each square, so that each color stood out separately. The colors were the three primary colors—red, yellow, blue—and the three secondary colors—orange, green, purple. The names of the colors were distinctly written above the papers. When the children became familiar with the idea of association between the color and the written word, I covered the papers, allowing only the names to be seen. When the child would hesitate, I would turn up the added sheet and reveal the color itself. Then I made use of the kindergarten balls, which are soft, colored, worsted balls. We sat on the floor (this order being given, of course, as part of the exercise), and rolled the balls to each other. I sat opposite to the children, facing the light. I had a long pointer at first, which I used to point out the written sentence on the board, such as, “Please roll me the red ball.” I repeated the sentence in spoken language, and this was the signal for action. At the time of closing school, I had dropped all means of communication in this exercise, except that of speech. I spoke the sentences as rapidly as I could. I did not attract any individual attention, by first calling out the name of any special child, but simply spoke the words, looking straight ahead. Whoever had the required ball would roll it. This exercise is one of the best we have had for quick speech-reading. At Easter time we had colored Easter eggs instead of balls. When the flowers came, we had still more beautiful opportunities for color exercises. The action

had to be varied, and so the verbs *smell* and *look* were easily introduced. Following them the verbs *taste* and *touch* came quite naturally. Fruits were used with the flowers, and sentences suiting the actions were composed. Imagine the pleasure of a little deaf child in being told to "Smell the purple flower;" "Touch the large apple;" "Look at the cherries;" "Taste the banana!" As in former exercises, the children were able, in time, to follow the directions by watching my mouth alone. Elementary lessons in number were constantly sprinkled in with other exercises. I remember one which was especially successful. It was something as follows: "Put five blue balls on the floor;" "Jump over three blue balls;" "Give one ball to Gracie;" "Put one ball into the basket." The children had a few lessons with the counting-frame, which they enjoyed intensely. The kindergarten weaving was also a direct help in giving them ideas about number.

We were able to have true kindergarten lessons in giving ideas about qualities, such as *smooth*, *rough*, *soft*, *hard*, and about materials, such as *wood*, *wool*, *rubber*, etc. This we did by covering up the objects in a napkin and having the children guess, by resemblance or difference of form or texture, what the object could be.

Quite recently we have had an exercise similar to the ball-game referred to above. Instead of the colors, we introduced the words *glass*, *rubber*, *woolen*, as: "Roll the glass ball to George," "Roll the rubber ball to Floyd." Two children were seated at a long table, one at each end. Both children were congenitally deaf. The exercise was given, at first, in connection with line-writing. The words *glass* and *woolen* were new words. The game lasted briskly for about fifteen or twenty minutes. Before it was over the orders were read from the mouth, entirely without the help of writing.

One of the pleasantest and most interesting exercises has been our "lunch." We had a set of doll's dishes, tiny glasses, forks, spoons, knives, napkins, etc., to match. Sometimes the table was set by regular command; that is, the order was written on the board, and then read or spoken. It is a well-established fact that all children like to eat. It is a logical consequence that children are very sure to ask, in some way, for what they want to eat. As our school was essentially a speech-school, it was necessary that the children should have some definite way of finding out the names of things. So we had the names of all the articles of food written on tiny cards, and stuck into the articles themselves. Each child had a little box full of similar cards at the side of his plate. When he wanted any special thing, he would hunt up a card in his pile, and match the name of the article desired. Then showing it to me, I would give the child the spoken form of the word and he would repeat it. Gradually the cards were left aside. The little girl, who had once heard, began to speak in full and rounded sentences, and the little boy would ask for what he wanted by words instead of signs. The sentences were naturally limited, but among those which were frequently used at our table, I could always be sure that both children would understand whatever I might ask them. This lunch-exercise has afforded opportunities for a little training in table-manners, and has certainly been a real incentive to speech and speech-reading. We have, now and then, invited several of the hearing children upstairs to share our lunch, greatly to the enjoyment of both the deaf children and their guests. On October twenty-third, my journal says: "For the first time (and this was at lunch) Gracie really attempts very earnestly, of her own accord, to follow my lips, and makes several incoherent sounds, yet not unlike the spoken word. At any rate, she evidently tried

to repeat something in sound, which she thought the motion of my lips had suggested."

Our little train of toy-cars has been the means of most genuine and enthusiastic enjoyment, and has brought us some things even more valuable than its wonderful merchandise. We had a store furnished with materials from our Museum of Common Things, such as wood, coal, spools, bread, oats, salt, sugar, etc. These articles were bought by writing or copying their names, and afterward asking for them in speech. The articles were then wrapped up in paper, and their names written on the outside of the bundles by the store-keeper. The package was transferred to the train, the signal-bell rung, and the train rushed off to the next station.

We have had very good times taking care of the horse, feeding him, and giving him water, and making him generally happy and comfortable. Our doll has been a most helpful and an almost constant companion in our exercises, plays and lunches.

We have had a few conversational lessons with Prang's pictures of the trades and industries. We have taken several Saturdays, during this spring, for trips to the art gallery and to the national museum. These trips were naturally filled with interesting opportunities for the development of observation, thought, and speech.

School-Government.

The essential life of the kindergarten being one of freedom, the natural character of children comes to the surface, and the teacher has much greater opportunity for dealing with the child's moral nature than in the ordinary school. Our school being a playing and talking school, we have not felt the need of that melancholy machinery — routine. Everything has been as free and spontaneous as possible. Of course, we have had hard struggles, — very hard struggles sometimes. But, by patient and persistent search after causes, I have always found, whenever I have found anything, that the child had a reason for misunderstanding me, and that, generally, it was a lack of intuition — of a fine appreciation on the teacher's part, that had aroused the spirit of rebellion.

With the child that has given me the most trouble, I have earnestly tried, as far as I could, to follow Herbert Spencer's principle of punishment by natural consequences. Like most natural methods it has been *very slow*. But I feel that it has been a means of positive good in the development of character. For instance, the child often became very much interested in the kindergarten work, and would object violently to coming up stairs for another exercise. Although it has taken a long, long while for her to understand that in retarding one exercise she delayed, and often missed, the occupation that was to follow; although, at first, this deprivation seemed cruelly unjust to her, she gradually saw that her freedom and happiness were in her own hands, that she was her own tyrant, and so, in time, the victory has been won. There have been other cases much more complicated, and which have required deeper thought and much more delicate insight, but this case is so simple, and the method has proved so effectual, that I have chosen it to show that deaf children, of all others, need the most systematic and rational moral training. It should be a system that has for its first principle: "Seek the cause." I have learned, through my own failures, that we must have a steadfast, wise, patient will. If we will calmly put aside all pre-conceived ideas of discipline, and begin by devoting ourselves to this one simple principle of seeking the cause of things, we shall discover that in teaching deaf

children we are constantly running the risk of misunderstanding the child, because we do not sufficiently realize that the child is constantly misunderstanding us.

Let us have simplicity, and we shall have clearness. This demands that the teacher should feel, most earnestly, that underlying all school discipline should be the sincere reverence for the development of individual character. The greatest care should be taken to avoid all arbitrary rules and unexplained reprimands. This implies that the teacher should have a constant willingness to repress her own general beliefs and feelings, and to catch the especial meaning or need of each new occasion. In order to deal with realities, let us grant the child that moral freedom and health which will allow him to evolve in *his own mind* a sound and *personal* sense of right.

We have learned that deaf children do not use signs if they can have words.

We have learned that the kindergarten should be studied and used in the home.

We have learned that departments for deaf children should be established in connection with free kindergartens.

We believe a new world lies before the deaf child. Language is to be developed naturally. A great command is to be gained. The kindergarten is a means for this end. It develops mind and heart, and the child's whole being. It brings him in harmony with outward nature. Let us be ready to offer the little child a natural way to express his full, eager, young life. O, it is a great and glorious work! What is the natural way? Does not every mother-heart know? Does not every one, who has felt the beauty of child-life, know? Can we wait until the *school-age*? For what was this sweet, eager, impressionable time of infancy and youngest childhood given? Is it not especially for the general development of body, and mind, and heart? Is it not especially for the development of speech? *Ought we to wait?* How can we allow these little spirits to be imprisoned by our neglect of human nature's most natural time for *spontaneous speech*? Are we not overlooking one of God's best opportunities?

THE DISCUSSION.

Vice-President Stainer: May I ask Mrs. Burton to help me on one point? I have taken a deep interest in this line-writing. I understand it to be a stenography founded on Visible Speech; that is to say, sound written in the shortest, and, therefore, in its quickest form. I should like an illustration of the difference between the ordinary Visible Speech and this line-writing.

[Mrs. Burton gave, on the black-board, the exhibition desired.]

Mrs. Dunham: I have only become acquainted with line-writing recently. I taught it to my congenitally deaf boy. I have never heard of any other method of articulation that I had not learned and tried. This, I consider, very far superior at present. I cannot imagine that I shall ever abandon it. It has been of incalculable benefit to me and to my little child. I have been able to decide already that he can write it with great ease. It presents a picture of the words very distinctly. He takes them almost immediately, and reproduces them at once very nearly perfectly. He is seven years old, to be sure older than the congenitally deaf pupil of whom Mrs. Burton has told you. He has visited Mrs. Burton's school occasionally, and I desire to testify my thanks for the help she has given him. I think that all the parents here ought to become acquainted with this line-writing system.

Prof. Gordon: I have listened to the paper by our president, and the following one by Mrs.

Burton, with very great interest, and with considerable appreciation. I cannot quite follow this "line-writing" yet, but I hope sometime to be able to understand it more fully. As early as 1838, something was attempted in this direction by Leon Vaisse, of the Paris institution. He devised graphic symbols to represent and suggest the characteristic positions of the vocal organs for the sounds of the French language. His phonographic symbols were crude, and doubtless founded, in part at least, upon a faulty analysis of the mechanism of speech. I believe he represented the vowels by larger or more prominent characters than the consonantal elements. The system was devised as an aid to articulation teaching, but possibly its imperfections prevented its general adoption. I do not recall any similarity between the forms of the mimo-stenographic symbols of Prof. Vaisse and of those used by Prof. Bell.

Vice-President Stainer: I have no doubt that Prof. Bell is acquainted with the fact that somebody has previously tried to make speech visible; but I suppose in that case, Prof. Gordon, it was intended for the deaf only. As I understand this, it is intended to be read by anybody.

President Bell: It is, sir. It was not intended for this purpose by my father, and it is only quite recently that I saw the application of it. It was introduced, in the first place, for the purpose of teaching articulation in our primary schools. He urged that this phonetical system in our primary schools would have less objections than any other strange form of characters, because the pupils, when they grew up, could learn the practice of contraction for shorthand reporting, and make their livelihood out of it by simply joining the characters together. For clearness and simplicity, however, they are separated. The system has been developed in the latter part of his work into a system of stenography for all languages.

Prof. Gordon: What is the easiest way for teachers to get hold of line-writing, for use in the coming autumn?

President Bell: Well, if any teacher feels sufficiently interested in it to send me his or her name and address, and wants the alphabet, I will be glad to have it hektographed, with some specimens. I would simply say that I have considered the advisability of using the line-writing as my father gave it, and the advisability of joining the letters together in the latter part of his work; but I came to the conclusion that it was better to separate the letters, so that the same letter should always come in the same relative position. In shorthand writing you go up and down from the line, and the same letter may stand for two words, and although it is very much more rapid when the letters are joined together, it is simpler and clearer, I think, to write them separately. It makes a clearer picture, and the writing is more rapid than anything else excepting shorthand itself.

List of Members Attending the Convention.

Portland School for the Deaf, Portland, Me.

ACTIVE

Miss Ellen L. Barton,
" Anna C. Allen,
" Laura G. Ames,
" Hattie R. Estabrook.

Horace Mann Day School for the Deaf, Boston, Mass.

ACTIVE.

Miss Sarah Fuller,
" Ella C. Jordan,
" Sarah A. Jordan,
" Ellen Shaw,
" Mattie F. Metcalf.

HONORARY.

Miss Alice C. Jennings.

Boston.

ACTIVE.

Miss Louisa H. Hinckley,
" S. E. Littlefield.

HONORARY.

Alfred E. Burton.

New York Institution for the Deaf and Dumb, Washington Heights, New York City.

ACTIVE.

Dr. Isaac Lewis Peet,
E. H. Currier,
Miss A. M. Toles,
" Elizabeth Mitchell,
" Julia F. Brearley,
" Josephine F. Rintoul,

HONORARY.

Avery T. Brown,
James C. Carson, M. D.,
F. D. Clarke,
Thomas F. Fox,
W. G. Jones,
C. W. Van Tassell,
Dr. Thomas Gallaudet.

Clarke Institution for Deaf-Mutes, Northampton, Mass.

ACTIVE.

Miss Harriet B. Rogers,
 " Caroline A. Yale,
 " Katherine Fletcher,
 " A. Josephine Vinton,
 " Rachel C. Fish,
 " M. A. Kathan,
 " Fannie W. Gawith.
 " Alice E. Worcester,
 " Rebecca E. Sparrow,
 " Ruth Witter.

HONORARY.

Lewis J. Dudley,
 Miss H. O. Yale.

Rhode Island School for the Deaf, Providence, R. I.

ACTIVE.

Miss Katharine H. Austin,
 " Ardelia C. Dewing,
 " Ellen J. Kerr.

New York State (General).

ACTIVE.

Miss Amelia Selleck,
 Westchester,
 " Mary E. Tousey,
 Babylon,
 " Lillie E. Warren,
 31 E. 17th St., N. Y.
 " L. A. Hick, Mt. Vernon,
 Prof. Edw. Grossmann,
 112 E. 80th St., New York.

HONORARY.

Henry S. Redfield, Elmira,
 Dr. F. L. Radcliff,
 Brooklyn,
 A. J. Pierson,
 Edgar S. Werner, Albany,
 W. L. Waters, Brooklyn,
 John Carlin, 212 W. 25 St.,
 New York,
 Mrs. John Carlin, 212 25th
 St., N. Y.,
 W. E. Partridge, Brooklyn,
 Mrs. W. E. Partridge,
 Brooklyn,
 Miss Kattie Partridge,
 Brooklyn,
 Mrs. Maria Fell,
 Schenectady.

American Asylum for the Deaf and Dumb, Hartford, Conn.

ACTIVE.

Job Williams,
 Abel S. Clark,
 Miss Ada R. King.

St. Joseph's Institute for the Improved Instruction of Deaf-Mutes, Fordham, N. Y.

ACTIVE.

Miss Anna M. Larkin,
 " M. Frances O'Connor,
 " Mary C. Hendrick,
 " Mary E. Livingston,
 " Margaret A. Regan.

Institution for the Improved Instruction of Deaf-Mutes, New York City.

ACTIVE.

D. Greenberger,
 Miss A. L. Hare,
 " Sadie Keeler,
 " L. J. Smith,
 " M. M. Root,
 " L. A. Buckingham,
 H. E. Lyman,
 D. H. Torrey,
 Miss M. Marshall,
 " S. Moffatt,
 D. L. Elmendorf.

HONORARY.

Mr. Benjamin,
 " Isaac Rosenfeld,
 " Eckman,
 " Hermann,
 Mrs. Rosenfeld,
 Miss Ida Rosenfeld,
 S. Goldsmith,
 Mrs. S. Goldsmith,
 S. P. Cornelius,
 Theo. Froehlich,
 Timothy F. Driscoll.

Western New York Institution for Deaf-Mutes, Rochester, N. Y.

ACTIVE.

Miss C. A. Yendes,
 " H. D. McGill,
 " Cornelia M. Ely.

*Le Couteulx St. Mary's Institution for the Improved Instruction of
Deaf-Mutes, Buffalo, N. Y.*

HONORARY.

Sister Mary Isidor,
" " Dositheus.

New Jersey.

ACTIVE.

Miss Caroline R. Lounsbury, Englewood.

Pennsylvania Institution for the Deaf and Dumb, Philadelphia.

ACTIVE.

Mrs. A. F. Snider.
Miss Fanny Wood.

HONORARY.

John P. Walker.
F. W. Booth,
S. T. Walker,
W. G. Jenkins,
Geo. L. Weed,
Miss Kate E. Barry,
" Laura Nelson.

Oral Branch of the Pennsylvania Institution.

ACTIVE.

Miss Emma Garret,
" Mary S. Garrett,
" Sarah D. McClain,
" F. C. McDowell.
" Susan E. Bliss,
" Emma F. West,
" Mary B. Shaw,
Mrs. E. M. C. Harvey,
Miss Hattie H. Bedford,
" Bessie D. Dunning,
" Agnes Grinom.
" Clara E. Weidner,
" Mary B. C. Brown,
Sidney C. Morrison.

*Western Pennsylvania Institution for the Deaf and Dumb,
Pittsburgh, Pa.*

ACTIVE.

Miss Lottie Kirkland.

Scranton Day School for the Deaf, Scranton, Pa.

ACTIVE.

Miss Mary Allen, Philadelphia.

Wilmington, Delaware.

ACTIVE.

Miss Mary C. Hoopes.

Maryland School for the Deaf and Dumb, Frederick, Md.

ACTIVE.

Miss Kate H. Fish,
" Emily D. Bokee,
" Florence H. Fitch,

HONORARY.

Charles W. Ely.

*Prof. A. Graham Bell's Private School for the Deaf,
Washington, D. C.*

ACTIVE.

A. Graham Bell,
Mrs. Gertrude Burton,
Mrs. Katharine Bingham,

HONORARY.

Mrs. Hull,
Miss Anna Schmidt,
John Hitz,

National Deaf-Mute College, Kendall, Green, Washington, D. C.

ACTIVE.

Miss Mary I. G. Gordon,
" Sarah H. Porter,
Dr. E. M. Gallaudet,
Prof. Joseph C. Gordon.

HONORARY.

Prof. Samuel Porter.

LIST OF MEMBERS.

Miss Mary E. Armistead, Washington, D. C.

*West Virginia Institute for the Deaf and Dumb and the Blind,
Romney, W. Va.*

ACTIVE.

John C. Covell.

Ohio Institution for the Deaf and Dumb, Columbus, Ohio.

ACTIVE.

Anna B. Chidester.

Cincinnati, Ohio.

ACTIVE.

Miss E. L. Hough,
" Maud Crosby.

Indiana.

ACTIVE.

Miss Sarah L. D. Summers.

Indiana Institution for the Deaf and Dumb, Jacksonville, Ill.

ACTIVE.

Miss Kate A. Getty,
" Laura D. Richards.

HONORARY.

Philip G. Gillett,
Rev. F. W. Wines.

Voice and Hearing School for the Deaf, Chicago, Ill.

ACTIVE.

Miss Mary McCowen,
" Cora M. Wheeler.

Chicago Day School for the Deaf, Chicago, Ill.

ACTIVE.

Miss Grace D. Emery.

Mississippi Institution for the Deaf and Dumb, Jackson, Miss.

ACTIVE.

Miss M. McGann.

Missouri Institution for the Deaf and Dumb, Jefferson City, Mo

ACTIVE.

Miss Eliza Reed.

HONORARY.

Miss Mollie Hughes,
" Ida Wheeler.*Michigan Institution for the Deaf and Dumb, Flint, Mich.*

ACTIVE.

Miss Carrie H. Summers.

Minnesota Institute for the Deaf and Dumb, and the Blind, Fairbault, Minn.

ACTIVE.

James L. Noyes,
Mrs. J. L. Noyes.*Nebraska Institute for the Deaf and Dumb, Omaha, Neb.*

ACTIVE.

J. A. Gillespie.

Wisconsin Phonological Institute, Milwaukee, Wis.

ACTIVE.

Paul Binner.

LIST OF MEMBERS.

Kentucky Institution for Deaf-Mutes, Danville, Ky.

ACTIVE.

Miss Helen O. Roberts.

" Anna M. Black.

Ontario Institute, Belleville, Canada.

ACTIVE.

Miss Harriett E. McGann.

HONORARY.

James Watson.

England.

ACTIVE.

J. D. Gaillard, Liverpool,
Rev. Wm. Stainer, London.

E. B. BENJAMIN,

**6 BARCLAY ST.,
12 VESEY ST.,
NEW YORK.**

**{ IMPORTER
AND
MANUF'R OF**

CHEMICAL

— A N D —

PHYSICAL

A P P A R A T U S.

A very large stock of first-class Apparatus for sale at lowest rates for best goods. Correspondence solicited.

A BOOK FOR EVERY VOCAL STUDENT.

**THE OLD ITALIAN
SCHOOL OF SINGING.**

By LEO KOFLER,

**TEACHER OF THE ART OF SINGING AND CHOIR MASTER
OF ST. PAUL'S CHAPEL, TRINITY PARISH,
NEW YORK.**

[From the American Art Journal.]

It is a well-known fact that the vocal profession presents a medley of various theories in utter contradiction of each other, and to endeavor to bring system and order out of this chaos is a Herculean task. Mr. Kofler's book gives abundant evidence that he possesses the necessary qualifications for such an undertaking. It is at once apparent that he has studied all existing systems of voice culture, and, moreover, he has sifted the immense amount of material with a sharp eye, and thus he is able to present to his readers the vocal method which he has made his own with a clearness that shows at once that he is not only a hard student and a deep thinker, but that he possesses in no ordinary degree the power of imparting his knowledge to others in the most interesting and practical way.

Cloth, \$1.25, post-paid. Address the Publisher,

EDGAR S. WERNER, Albany, N.Y.

ÆSTHETIC PHYSICAL CULTURE.

A SELF-INSTRUCTOR FOR ALL CULTURED CIRCLES, AND ESPECIALLY FOR ORATORICAL AND DRAMATIC ARTISTS.

By OSKAR GUTTMANN.

There is no similar work in English. It is of great *practical* value to public speakers and singers, actors, elocutionists, and to all who desire æsthetic physical development, whether of voice, gesture or physique. The author, without knowing of Delsarte, *has devised a system easily understood and applied*, which embodies the principles of the Delsarte Philosophy, simplified and made available. *Delsartians will find this book more serviceable than any other printed matter obtainable.*

Our literature possesses no work of this kind. Its special value is the strictly scientific basis on which the author rests. The book is to be considered in a twofold manner,—from the general standpoint of a person of culture, and from the particular standpoint of a professional artist. The author proceeds from the right principle, namely, that every actor must first be a man of culture. In this respect, the scope of the book is a masterpiece. Prof. Guttman's keen powers of observation, to which we had occasion to refer in reviewing his "*Gymnastics of the Voice*," are more strikingly manifested in "*Æsthetic Physical Culture*," and we urgently advise young persons of both sexes, who are anxious to improve themselves, to closely follow the teachings of both these books.

FROM LEO KOFLER, TEACHER OF THE ART OF SINGING, NEW YORK.

[In his "The Old Italian School of Singing."]

We have arrived now at the last expedient of a singer's good style in singing; namely, *the external demeanor of the body and the facial expression*. This subject ought to engage a singer's very careful attention and study. This was, hitherto, no easy matter. There was, to my knowledge, no work in existence that treated this subject fully and systematically from the singer's standpoint. It is true that in a number of books pertaining to the vocal and dramatic art, this subject has been ventilated; but nowhere has it received the attention it deserves, except at the hands of Oskar Guttman, in his excellent work, "*Æsthetic Physical Culture*." He treats this subject in his own practical and philosophical way, and I warmly commend his book to the faithful perusal of every student of vocal and dramatic art.

FROM J. E. FROBISHER, DIRECTOR OF COLLEGE OF ORATORY AND ACTING, NEW YORK.

I have read "*Æsthetic Physical Culture*" with delight. And I must say that while it is so compact in bulk it is truly the most comprehensive work I have as yet seen upon the subject. It is so suggestive in its style, touching upon every desired point, leaving nothing, apparently, unsaid, and in fact covering the entire field of æsthetic movements. Similar ideas I have tried to inculcate all my life, but perhaps in not so extended and formal a method. It is a work that ought to be studied and practiced by every clergyman, lawyer, actor, and elocutionist in the land. For myself I shall try to put it into the hands of my pupils as a most excellent guide and monitor in their work.

Copiously illustrated; handsomely printed and bound; price \$2, postpaid.

Address the Publisher,

EDGAR S. WERNER, Albany N. Y.

SECOND EDITION—ENLARGED.

Delsarte System of Oratory,

By L'Abbe Delaumosne and Angelique Arnaud (pupils of Delsarte).

WITH AN ESSAY ON

"The Attributes of Reason," by Francois Delsarte.

(The only authentic published production from his pen.)

Indispensable to every person who wishes to give expression to his work, whatever that work may be,—Acting, Oratory, Painting, Sculpture, etc., etc.

PUBLISHER'S ANNOUNCEMENT.

Another edition of this the only English book attempting to give an exposition of the Delsarte Philosophy and Art of Expression has become necessary. In issuing the second edition, we have added the treatise of Mme. Arnaud who, like M. Delaumosne, was intimate with Delsarte for many years, and who possesses many of his papers and has treasured up many of his sayings. In certain respects, these authors know more of Delsarte, personally and professionally, than any other living persons. They are French, and thus were able to commune with their master in *his* own and *their* own mother tongue—an advantage that can hardly be overestimated. Their treatises are the only printed expositions of the Delsarte System, in any language.

We have also added "The Attributes of Reason," which, although an unfinished essay, furnishes a better specimen, perhaps, than hitherto available of Delsarte's acuteness, depth, and originality as a thinker. It was his last composition, and is translated directly from his own manuscript now owned by Rev. Wm. R. Alger, himself a devoted disciple and able exponent of Delsartism.

The book contains over 300 pages; is copiously illustrated with charts, figures and diagrams, and is printed and bound in fine style.

Price \$2, postpaid. Not for sale at bookstores.

Send direct to the Publisher,

EDGAR S. WERNER,

Editor of THE VOICE, Albany, N. Y.

☛ Descriptive circular sent on application.

THE THROAT AND ITS FUNCTIONS

AND

Swallowing, Breathing and the Production of the Voice.

By LOUIS ELSBERG, A. M., M. D., of New York.

Twenty-five illustrations, most of which were prepared expressly for this work, at large expense.

Teachers will find this a Most Excellent Text-book for

ELOCUTIONARY, SINGING AND SCHOOL PUPILS:

Sent Post-paid on Receipt of Price.

Address the publisher,

EDGAR S. WERNER,

Albany, N. Y.

THE GREATEST WORK ON ELOCUTION.

PLUMPTRE'S

King's College Lectures on

ELOCUTION;

Or the Physiology and Culture of Voice and Speech, and the Expression of the Emotions by Language, Countenance and Gesture. To which is added, a special lecture on the causes and cure of impediments of speech. Being the substance of the introductory course of lectures annually delivered by Charles John Plumptre, lecturer on public reading and speaking at King's College, London. Dedicated, by permission, to H. R. H. the Prince of Wales. New and greatly enlarged illustrated edition. 1881. 481 pages, octavo, cloth, with portrait of author.

By special arrangements with the publishers (Messrs. Trübner & Co.), we can supply this most valuable book for

\$4, POST-PAID (Regular Price, \$6).

A BOOK OF PRACTICAL VALUE.

Truths of Importance to Vocalists.

By EDMUND J. MYER.

Cloth, 50 cents; postpaid. Address,

EDGAR S. WERNER, Albany, N. Y.

A BOOK FOR ARTICULATION TEACHERS!

Second Edition — Revised and Enlarged.

GYMNASTICS OF THE VOICE;

A SYSTEM OF CORRECT BREATHING IN SINGING AND SPEAKING, BASED
UPON PHYSIOLOGICAL LAWS.

A Practical Guide in the Training and Use of the Speaking and Singing Voice,

DESIGNED FOR SCHOOLS AND FOR SELF-INSTRUCTION,

By OSKAR GUTTMANN,

Professor of Aesthetic Physical Culture, Dramatic Reading and Acting; Author of
"ÆSTHETIC PHYSICAL CULTURE," "TALENT AND SCHOOL," etc.

PUBLISHER'S ANNOUNCEMENT.

Many persons *begin* their professional career by publishing "treatises," "methods," "systems"—mere *theories* which the *authors themselves* have not tested, and which are either *plagiarisms*, or, if original, possess little or no merit; sometimes these publications are even injurious because they are the result of ignorance and false principles.

OSKAR GUTTMANN, in contradistinction to the many writers who flood and afflict the public, did not take up the pen until he had something of value to communicate,—something which had been subjected to the crucial test of PRACTICAL EXPERIENCE. But he had no prototype, no author from whom he could draw. He was alone. He was the discoverer, the inventor, the pioneer, the formulator. It is well that he was forced to go to nature, to drink at the fountain head, for in so doing he produced a work founded upon the natural, scientific principles governing vocal anatomy, physiology and hygiene; the production, management and cultivation of the singing and speaking voice.

Twenty-five years ago was issued the first German edition of GYMNASTICS OF THE VOICE, which at once became a standard authority,—a position it holds until this day, notwithstanding the many volumes that have appeared and which are—forgotten! It has been the source from which many subsequent writers have taken ideas and exercises, generally without credit and also without properly and intelligently reproducing them.

The repeated editions in Europe, and the necessity of another American edition so soon after the issue of the first, are proof positive of its merit and durability. *It is a book that has come to stay!*

The text for the new edition has been thoroughly revised from beginning to end. Many pages of new matter have been added, including *numerous exercises for practice which have NEVER BEFORE BEEN IN PRINT*, and which are the results of the author's life-long study and experience; and the whole work has been put into a form adapted to use as a text-book in colleges and schools, and as a self-instructor by any person.

POINTS OF SUPERIORITY.

- | | | |
|--|--|--|
| 1. It is founded on natural scientific laws. | 2. It is safe. | 3. It is plain and practical. |
| 4. It has been thoroughly tested. | 5. It has produced satisfactory results. | 6. It is recognized as authority in America and in Europe. |
| 7. It has been translated into a number of languages. | 8. It is used as a text-book in Harvard University, in other schools, and by private teachers. | 9. It is complete and comprehensive, yet concise. |
| 10. It is original in design, convenient in arrangement, and unequalled in excellence. | 11. It is finely printed and bound and fully illustrated. | 12. It is a sure guide in the training of the voice. |
| | | 13. It is sold at a low price. |

Price \$1.25, postpaid. Liberal reduction by the dozen. AGENTS WANTED.

Address the Publisher, EDGAR S. WERNER,

Editor of THE VOICE, Albany, N. Y.

The Voice.

An International Review of the SPEAK- ING and SINGING VOICE.

The Only Journal in the World making the Cure of
Vocal Defects a Specialty.

It aims to give practical instruction in the USE, IMPROVEMENT and RESTORATION of the voice, in READING, SPEAKING and SINGING

Its value is testified to by scores of speech-sufferers and by leading MUSICIANS, EDUCATORS, CLERGYMEN and PHYSICIANS in different parts of the English-speaking world.

Its contributors include LEADING SPECIALISTS of the VOICE, in America and in Europe.

The Voice

IS

Indispensable to every **Singer** and **Elocutionist**;

A means of communicating necessary professional knowledge to every **Physician** and **School Teacher**;

Of great value to every **Public Speaker**;

A guide to **Parents** in directing and improving the speech of their **Children**;

The press exponent of the **human voice** in its manifold phases; to treat of its **uses** and **capabilities**; give direction to its **cultivation** and **management**, whether in **singing**, **preaching**, **lecturing**, **reading**, or **conversing**; point out the way to remedy its **bad habits** or **defects** and restore it to **healthful action**, organic and functional;

A journal which discusses **pulpit** and **secular oratory**; the methods of teaching **reading** and **declamation** in schools; the various systems of **cultivating the voice** for singing; **elocution**; the **art of conversation**; and, in fact, everything pertaining to the **speaking** and **singing voice**.

Published monthly at \$1.50 a year in advance; single copy, 15 cents.

Address,

EDGAR S. WERNER,

Editor of THE VOICE, ALBANY, N. Y.

THE AMERICAN ANNALS OF THE DEAF AND DUMB

is a quarterly periodical, devoted to the theory and practice of the education of the deaf. It is edited by Dr. E. A. Fay, Professor in the National Deaf-Mute College, Washington, D. C., under the direction of Dr. E. M. Gallaudet, President of the National College; Dr. I. L. Peet, Principal of the New York Institution; Dr. Thos. MacIntire, Principal of the Western Pennsylvania Institution; Miss H. B. Rogers, Principal of the Clarke Institution, and Dr. P. G. Gillett, Superintendent of the Illinois Institution for the Education of Deaf-Mutes. The contributors to the *Annals* are the leading instructors of the deaf in America and Europe, including advocates of the manual, the oral, and the combined methods.

The twenty-nine volumes of the *Annals* already published afford the most complete cyclopedia obtainable of all matters relating to the deaf. The early volumes were for some time out of print, but have now been reprinted, and complete sets can be furnished at \$2.00 a volume.

Each number of the *Annals* contains at least sixty-four pages of matter, principally original. The subscription is \$2.00 a year, payable in advance. Single numbers, 50 cents.

All communications relating to the *Annals* may be addressed to the Editor,

E. A. FAY,
NATIONAL DEAF-MUTE COLLEGE,
KENDALL GREEN, WASHINGTON, D. C.

JOSEPH GILLOTT'S **STEEL PENS.**

GOLD MEDAL, PARIS, 1878.

HIS CELEBRATED NUMBERS

303—404—170—604—332

and his other styles may be had of all dealers throughout the world.

Joseph Gillott & Sons, New York.

ANNOUNCEMENT.

JUST ISSUED.

A new edition of the "PRINCIPLES OF RHETORIC," by ADAMS S. HILL, Professor of Rhetoric and Oratory in Harvard College, containing an index of the authors quoted.

HILL'S "PRINCIPLES OF RHETORIC" was adopted August 14, 1879, for exclusive use in the High Schools of the City of Chicago, and re-adopted June 13, 1884.

RETAIL PRICE, 80 cents ; EXCHANGE, 45 cents.

Standard Text-Books Published by Harper & Brothers.

HARPER'S GEOGRAPHIES.—Two-Book Series.

They are approved by the highest professional authorities ; they bear the test of the class-room ; they are the cheapest.

HARPER'S ARITHMETICS —Two-Book Series.

They combine oral and written work ; contain a minimum of theory and a maximum of practice ; the character of the problems is entirely practical ; they are the cheapest.

HARPER'S NEW LANGUAGE SERIES.—In Three Books.

It contains subject-matter of the best arrangement and selection ; the topical analysis and black-board reviews are excellent ; it combines theory and practice in the best possible manner ; it is the cheapest.

HARRINGTON'S GRADED SPELLING-BOOK.

A vigorous and radical attack upon an old and vicious system in education ; it contains script forms for beginners ; the selection of words for study is rational ; it is the cheapest.

For sample copies, prices, terms of introduction, etc., address

HARPER & BROTHERS,
FRANKLIN SQUARE, NEW YORK.

— — —

• •

— — —

Notes:

52

© 2000 Blackwell Science Ltd

1. **Introduction**

— — — — —

1

— • —

11.11.11

—

—

...

—

100

— — —

1 2 3 4

...

1999, 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016, 2017, 2018, 2019, 2020, 2021, 2022, 2023, 2024, 2025, 2026, 2027, 2028, 2029, 2030, 2031, 2032, 2033, 2034, 2035, 2036, 2037, 2038, 2039, 2040, 2041, 2042, 2043, 2044, 2045, 2046, 2047, 2048, 2049, 2050, 2051, 2052, 2053, 2054, 2055, 2056, 2057, 2058, 2059, 2060, 2061, 2062, 2063, 2064, 2065, 2066, 2067, 2068, 2069, 2070, 2071, 2072, 2073, 2074, 2075, 2076, 2077, 2078, 2079, 2080, 2081, 2082, 2083, 2084, 2085, 2086, 2087, 2088, 2089, 2090, 2091, 2092, 2093, 2094, 2095, 2096, 2097, 2098, 2099, 2100, 2101, 2102, 2103, 2104, 2105, 2106, 2107, 2108, 2109, 2110, 2111, 2112, 2113, 2114, 2115, 2116, 2117, 2118, 2119, 2120, 2121, 2122, 2123, 2124, 2125, 2126, 2127, 2128, 2129, 2130, 2131, 2132, 2133, 2134, 2135, 2136, 2137, 2138, 2139, 2140, 2141, 2142, 2143, 2144, 2145, 2146, 2147, 2148, 2149, 2150, 2151, 2152, 2153, 2154, 2155, 2156, 2157, 2158, 2159, 2160, 2161, 2162, 2163, 2164, 2165, 2166, 2167, 2168, 2169, 2170, 2171, 2172, 2173, 2174, 2175, 2176, 2177, 2178, 2179, 2180, 2181, 2182, 2183, 2184, 2185, 2186, 2187, 2188, 2189, 2190, 2191, 2192, 2193, 2194, 2195, 2196, 2197, 2198, 2199, 2200, 2201, 2202, 2203, 2204, 2205, 2206, 2207, 2208, 2209, 2210, 2211, 2212, 2213, 2214, 2215, 2216, 2217, 2218, 2219, 2220, 2221, 2222, 2223, 2224, 2225, 2226, 2227, 2228, 2229, 2230, 2231, 2232, 2233, 2234, 2235, 2236, 2237, 2238, 2239, 2240, 2241, 2242, 2243, 2244, 2245, 2246, 2247, 2248, 2249, 2250, 2251, 2252, 2253, 2254, 2255, 2256, 2257, 2258, 2259, 2260, 2261, 2262, 2263, 2264, 2265, 2266, 2267, 2268, 2269, 2270, 2271, 2272, 2273, 2274, 2275, 2276, 2277, 2278, 2279, 2280, 2281, 2282, 2283, 2284, 2285, 2286, 2287, 2288, 2289, 2290, 2291, 2292, 2293, 2294, 2295, 2296, 2297, 2298, 2299, 2300, 2301, 2302, 2303, 2304, 2305, 2306, 2307, 2308, 2309, 2310, 2311, 2312, 2313, 2314, 2315, 2316, 2317, 2318, 2319, 2320, 2321, 2322, 2323, 2324, 2325, 2326, 2327, 2328, 2329, 2330, 2331, 2332, 2333, 2334, 2335, 2336, 2337, 2338, 2339, 2340, 2341, 2342, 2343, 2344, 2345, 2346, 2347, 2348, 2349, 2350, 2351, 2352, 2353, 2354, 2355, 2356, 2357, 2358, 2359, 2360, 2361, 2362, 2363, 2364, 2365, 2366, 2367, 2368, 2369, 2370, 2371, 2372, 2373, 2374, 2375, 2376, 2377, 2378, 2379, 2380, 2381, 2382, 2383, 2384, 2385, 2386, 2387, 2388, 2389, 2390, 2391, 2392, 2393, 2394, 2395, 2396, 2397, 2398, 2399, 2400, 2401, 2402, 2403, 2404, 2405, 2406, 2407, 2408, 2409, 2410, 2411, 2412, 2413, 2414, 2415, 2416, 2417, 2418, 2419, 2420, 2421, 2422, 2423, 2424, 2425, 2426, 2427, 2428, 2429, 2430, 2431, 2432, 2433, 2434, 2435, 2436, 2437, 2438, 2439, 2440, 2441, 2442, 2443, 2444, 2445, 2446, 2447, 2448, 2449, 2450, 2451, 2452, 2453, 2454, 2455, 2456, 2457, 2458, 2459, 2460, 2461, 2462, 2463, 2464, 2465, 2466, 2467, 2468, 2469, 2470, 2471, 2472, 2473, 2474, 2475, 2476, 2477, 2478, 2479, 2480, 2481, 2482, 2483, 2484, 2485, 2486, 2487, 2488, 2489, 2490, 2491, 2492, 2493, 2494, 2495, 2496, 2497, 2498, 2499, 2500, 2501, 2502, 2503, 2504, 2505, 2506, 2507, 2508, 2509, 2510, 2511, 2512, 2513, 2514, 2515, 2516, 2517, 2518, 2519, 2520, 2521, 2522, 2523, 2524, 2525, 2526, 2527, 2528, 2529, 2530, 2531, 2532, 2533, 2534, 2535, 2536, 2537, 2538, 2539, 2540, 2541, 2542, 2543, 2544, 2545, 2546, 2547, 2548, 2549, 2550, 2551, 2552, 2553, 2554, 2555, 2556, 2557, 2558, 2559, 2560, 2561, 2562, 2563, 2564, 2565, 2566, 2567, 2568, 2569, 2570, 2571, 2572, 2573, 2574, 2575, 2576, 2577, 2578, 2579, 2580, 2581, 2582, 2583, 2584, 2585, 2586, 2587, 2588, 2589, 2590, 2591, 2592, 2593, 2594, 2595, 2596, 2597, 2598, 2599, 2600, 2601, 2602, 2603, 2604, 2605, 2606, 2607, 2608, 2609, 2610, 2611, 2612, 2613, 2614, 2615, 2616, 2617, 2618, 2619, 2620, 2621, 2622, 2623, 2624, 2625, 2626, 2627, 2628, 2629, 2630, 2631, 2632, 2633, 2634, 2635, 2636, 2637, 2638, 2639, 2640, 2641, 2642, 2643, 2644, 2645, 2646, 2647, 2648, 2649, 2650, 2651, 2652, 2653, 2654, 2655, 2656, 2657, 2658, 2659, 2660, 2661, 2662, 2663, 2664, 2665, 2666, 2667, 2668, 2669, 2670, 2671, 2672, 2673, 2674, 2675, 2676, 2677, 2678, 2679, 2680, 26

•

• •

— •

_____ 6th Nov 1970



100

101

102

103

104

105

106

107

108

109

110

111

112

113

114

115

116

117

118

119

120

121

122

123

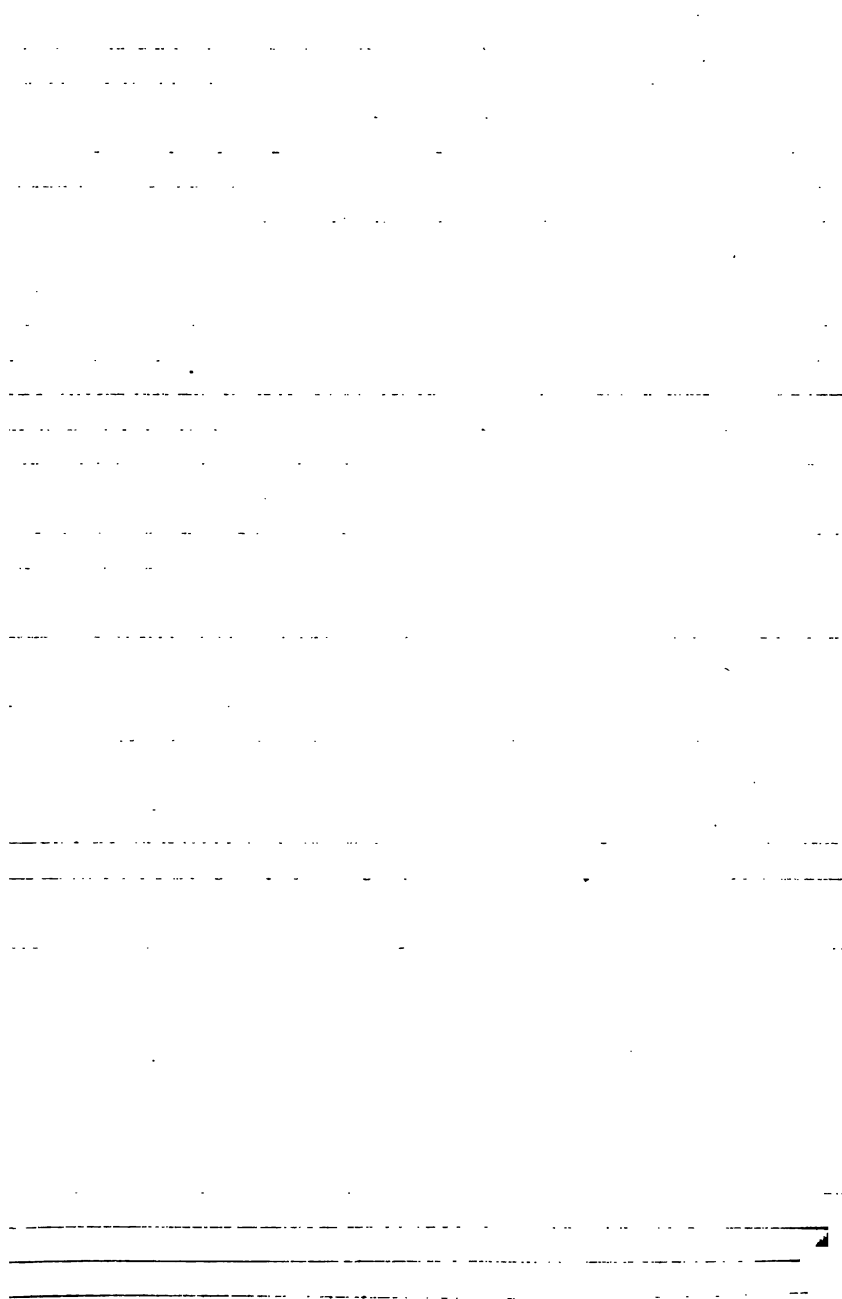
124

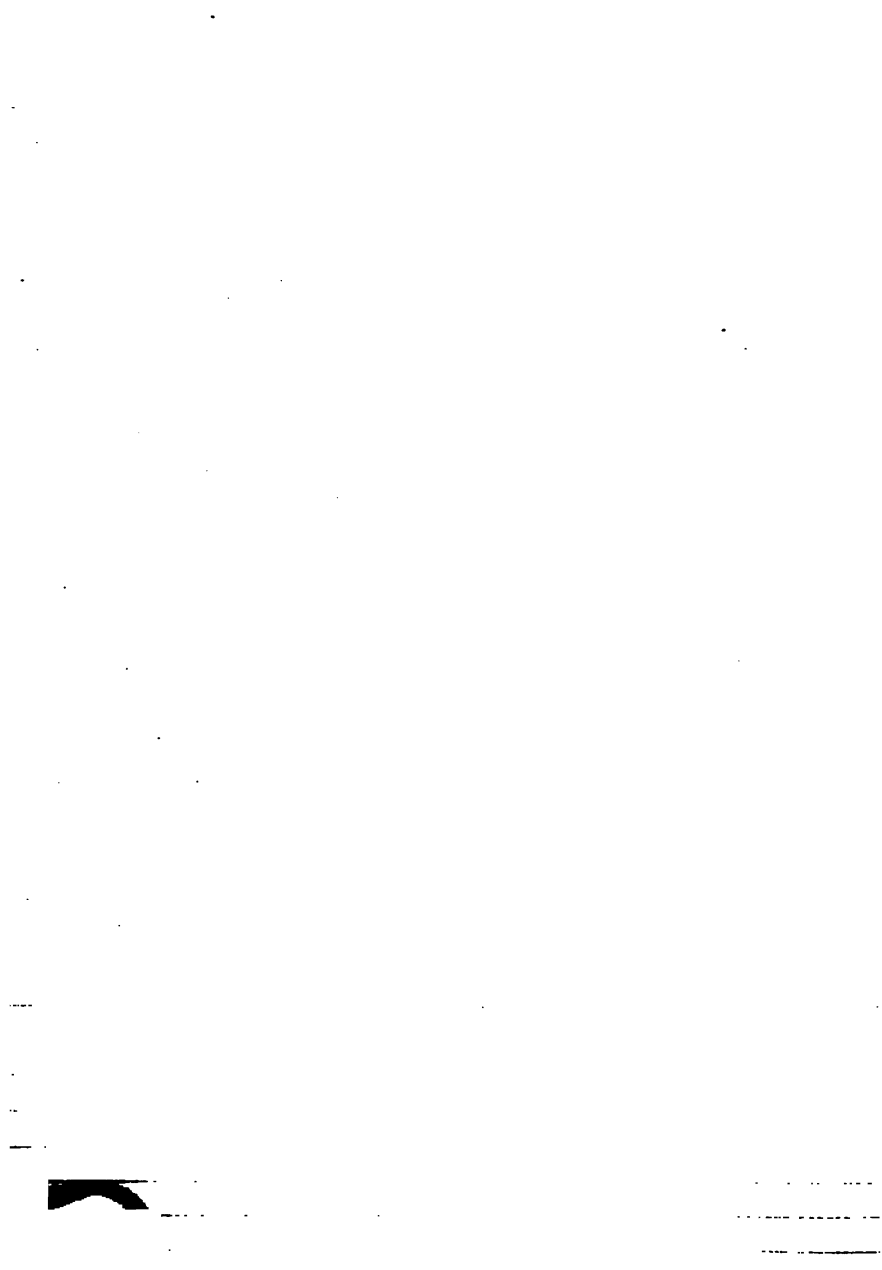
125

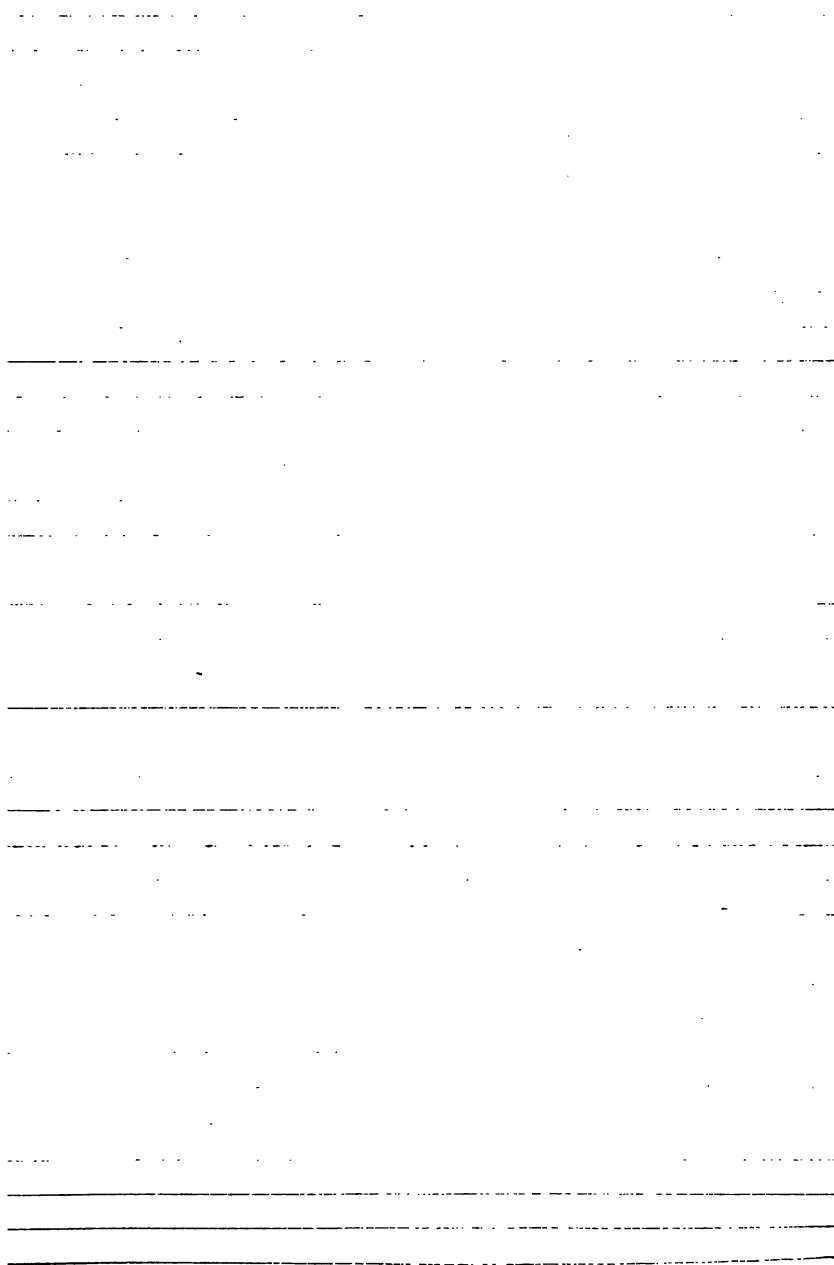
126

127

128









[The page contains faint horizontal lines suggesting ghosting or extremely faded text from the reverse side.]

1

2

3

4

5

6

7

8

9

10

11

12

13

14

15

16

17

18

19

20

21

22

23

24

25

26

27

28

29

30

31

32

33

34

35

36

37

38

39

40

41

42

43

44

45

46

47

48

49

50

51

52

53

54

55

56

57

58

59

60

61

62

63

64

65

66

67

68

69

70

71

72

73

74

75

76

77

78

79

80

81

82

83

84

85

86

87

88

89

90

91

92

93

94

95

96

97

98

99

100

101

102

103

104

105

106

107

108

109

110

111

112

113

114

115

116

117

118

119

120

121

122

123

124

125

126

127

128

129

130

131

132

133

134

135

136

137

138

139

140

141

142

143

144

145

146

147

148

149

150

151

152

153

154

155

156

157

158

159

160

161

162

163

164

165

166

167

168

169

170

171

172

173

174

175

176

177

178

179

180

181

182

183

184

185

186

187

188

189

190

191

192

193

194

195

196

197

198

199

200

201

202

203

204

205

206

207

208

209

210

211

212

213

214

215

216

217

218

219

220

221

222

223

224

225

226

227

228

229

230

231

232

233

234

235

236

237

238

239

240

241

242

243

244

245

246

247

248

249

250

251

252

253

254

255

256

257

258

259

260

261

262

263

264

265

266

267

268

269

270

271

272

273

274

275

276

277

278

279

280

281

282

283

284

285

286

287

288

289

290

291

292

293

294

295

296

297

298

299

300

301

302

303

304

305

306

307

308

309

310

311

312

313

314

315

316

317

318

319

320

321

322

323

324

325

326

327

328

329

330

331

332

333

334

335

336

337

338

339

340

341

342

343

344

345

346

347

348

349

350

351

352

353

354

355

356

357

358

359

360

361

362

363

364

365

366

367

368

369

370

371

372

373

374

375

376

377

378

379

380

381

382

383

384

385

386

387

388

389

390

391

392

393

394

395

396

397

398

399

400

401

402

403

404

405

406

407

408

409

410

411

412

413

414

415

416

417

418

419

420

421

422

423

424

425

426

427

428

429

430

431

432

433

434

435

436

437

438

439

440

441

442

443

444

445

446

447

448

449

450

451

452

453

454

455

456

457

458

459

460

461

462

463

464

465

466

467

468

469

470

471

472

473

474

475

476

477

478

479

480

481

482

483

484

485

486

487

488

489

490

491

492

493

494

495

496

497

498

499

500

501

502

503

504

505

506

507

508

509

510

511

512

513

514

515

516

517

518

519

520

521

522

523

524

525

52

[illegible]

1

2

3

4

5

6

7

8

9

10

11

12

— — — — —
— — — — —
— — — — —



1

1

1. The first step in the process of the scientific method is to ask a question. This question should be based on observation and should be specific and measurable. For example, "Does the amount of sunlight affect the growth of a plant?"

2. The second step is to form a hypothesis. A hypothesis is a statement that can be tested. It should be based on the question and should be a prediction of the outcome. For example, "If a plant receives more sunlight, then it will grow taller." This hypothesis can be tested by growing two plants under different conditions of sunlight.

3. The third step is to conduct an experiment. This involves setting up a controlled experiment where only one variable is changed at a time. In this case, the amount of sunlight would be the variable being changed. The experiment should be repeated multiple times to ensure that the results are consistent and not due to chance.

4. The fourth step is to analyze the data. This involves collecting and organizing the data from the experiment. The data should be presented in a clear and concise manner, such as a table or graph. The data should then be analyzed to see if it supports or refutes the hypothesis.

5. The final step is to draw a conclusion. This is a statement that summarizes the results of the experiment and whether the hypothesis was supported or not. For example, "The experiment showed that plants that received more sunlight grew taller than plants that received less sunlight, which supports the hypothesis."

6. The scientific method is a process that allows scientists to test their ideas and theories. It is a systematic approach to problem-solving that involves asking a question, forming a hypothesis, conducting an experiment, analyzing the data, and drawing a conclusion. This process is used by scientists in all fields of study to advance our understanding of the world around us.

[illegible]

100 100 100

• •

• •

© 2004 Blackwell Publishing Ltd *Journal of Internal Medicine* 255: 111–118

• • •

1. The first step is to identify the problem or question that needs to be answered. This involves understanding the context and the specific requirements of the task.

1. The first part of the document discusses the importance of maintaining accurate records of all transactions and activities. It emphasizes that proper record-keeping is essential for transparency and accountability, particularly in financial matters. The text outlines various methods for organizing and storing data, including digital databases and physical filing systems.

2. The second section focuses on the role of technology in modern record management. It highlights how cloud storage and data analytics tools can significantly improve the efficiency and security of record-keeping processes. The text also addresses potential risks associated with digital storage, such as data loss or unauthorized access, and provides recommendations for mitigating these risks.

3. The third part of the document explores the legal and regulatory requirements for record management. It discusses the various laws and standards that govern the collection, storage, and disposal of records, ensuring that organizations remain compliant with applicable regulations.

4. The fourth section addresses the challenges of managing large volumes of data over time. It discusses strategies for data retention, archiving, and periodic review to ensure that records remain relevant and accessible. The text also touches upon the importance of training staff to handle records properly and the need for clear policies and procedures.

5. The fifth part of the document provides a summary of key takeaways and offers practical advice for implementing effective record management practices. It encourages organizations to regularly assess their record-keeping systems and make necessary adjustments to stay current with best practices and technological advancements.

6. The final section of the document includes a list of references and resources for further reading. It points to various industry publications, legal texts, and online resources that provide more detailed information on record management topics.

7. The document concludes with a statement of intent, expressing the goal of providing a comprehensive overview of record management principles and practices. It invites readers to apply the information provided to their own organizations and seek further guidance as needed.



[illegible]

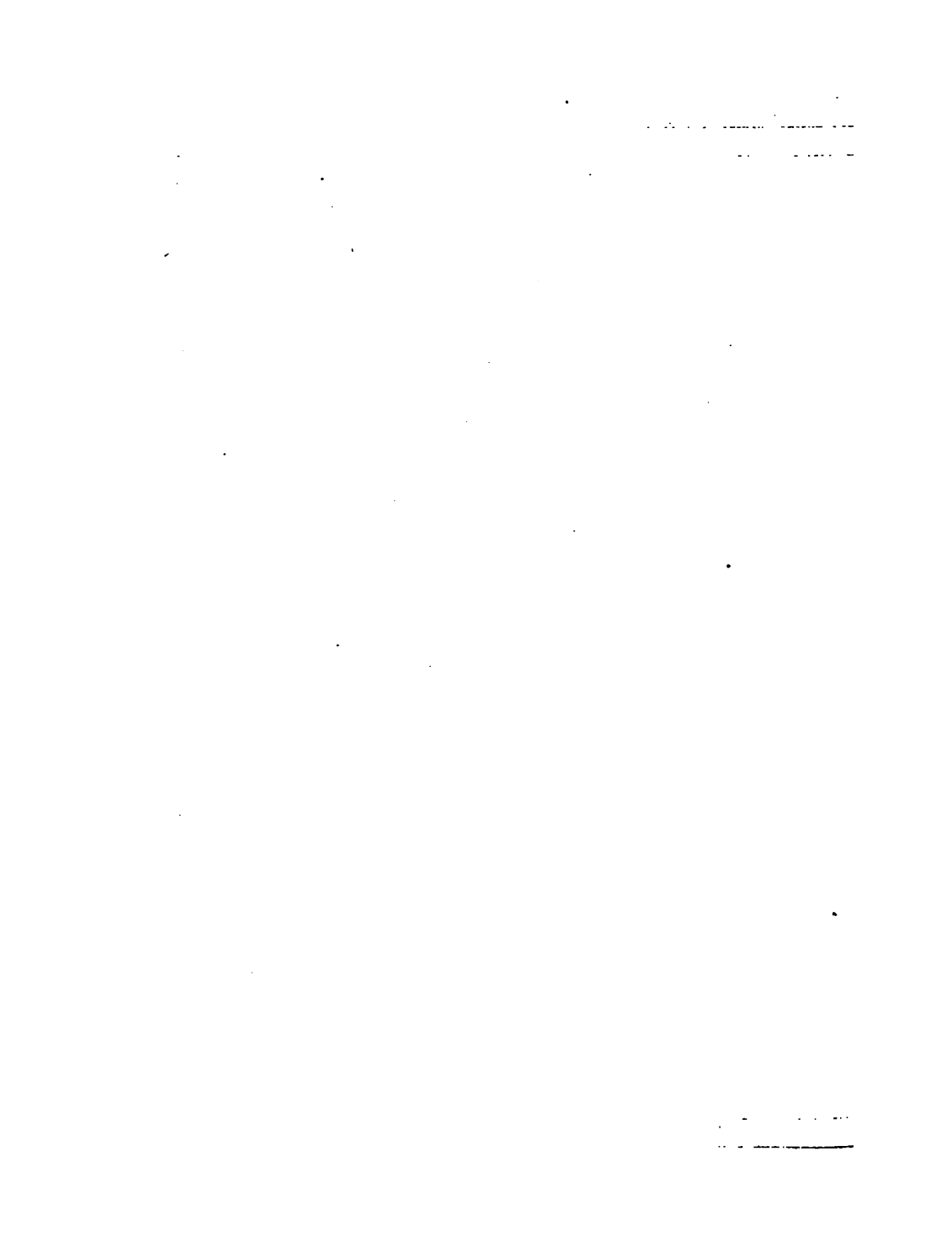
Figure 1. The effect of the number of trials on the number of correct responses. The number of correct responses was plotted against the number of trials for each condition. The number of correct responses increased with the number of trials for all conditions. The number of correct responses was highest for the condition with the highest number of trials (10 trials) and lowest for the condition with the lowest number of trials (2 trials).

1

2

3

4







1. The first part of the document is a letter from the President of the United States to the Congress, dated January 3, 1862. It is a very important document, as it contains the President's annual message to Congress. The letter is written in a formal, dignified style, and it is one of the most important documents in the history of the United States. It is a document that has been read and studied by many generations of Americans, and it is a document that has shaped the course of our nation's history.

2. The second part of the document is a letter from the President of the United States to the Congress, dated January 3, 1862. It is a very important document, as it contains the President's annual message to Congress. The letter is written in a formal, dignified style, and it is one of the most important documents in the history of the United States. It is a document that has been read and studied by many generations of Americans, and it is a document that has shaped the course of our nation's history.

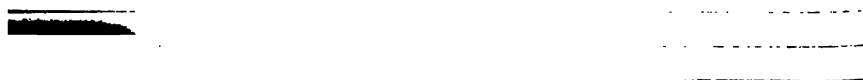
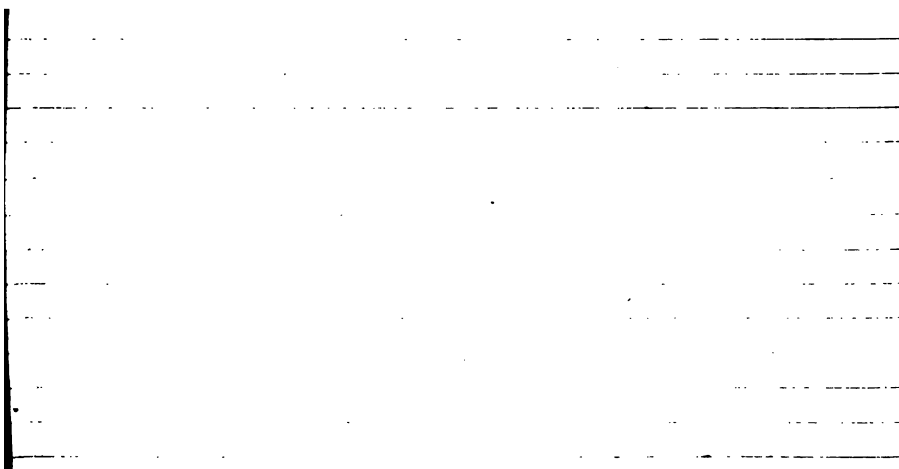
3. The third part of the document is a letter from the President of the United States to the Congress, dated January 3, 1862. It is a very important document, as it contains the President's annual message to Congress. The letter is written in a formal, dignified style, and it is one of the most important documents in the history of the United States. It is a document that has been read and studied by many generations of Americans, and it is a document that has shaped the course of our nation's history.

4. The fourth part of the document is a letter from the President of the United States to the Congress, dated January 3, 1862. It is a very important document, as it contains the President's annual message to Congress. The letter is written in a formal, dignified style, and it is one of the most important documents in the history of the United States. It is a document that has been read and studied by many generations of Americans, and it is a document that has shaped the course of our nation's history.

5. The fifth part of the document is a letter from the President of the United States to the Congress, dated January 3, 1862. It is a very important document, as it contains the President's annual message to Congress. The letter is written in a formal, dignified style, and it is one of the most important documents in the history of the United States. It is a document that has been read and studied by many generations of Americans, and it is a document that has shaped the course of our nation's history.

6. The sixth part of the document is a letter from the President of the United States to the Congress, dated January 3, 1862. It is a very important document, as it contains the President's annual message to Congress. The letter is written in a formal, dignified style, and it is one of the most important documents in the history of the United States. It is a document that has been read and studied by many generations of Americans, and it is a document that has shaped the course of our nation's history.

7. The seventh part of the document is a letter from the President of the United States to the Congress, dated January 3, 1862. It is a very important document, as it contains the President's annual message to Congress. The letter is written in a formal, dignified style, and it is one of the most important documents in the history of the United States. It is a document that has been read and studied by many generations of Americans, and it is a document that has shaped the course of our nation's history.



1. The first step in the process of creating a new product is to identify a market need. This involves conducting market research to determine what consumers want and what problems they are trying to solve.

2. Once a market need has been identified, the next step is to develop a concept for a product that addresses that need. This involves brainstorming ideas and creating a prototype to test the concept.

3. The third step is to conduct a feasibility study to determine if the product is viable and if there is a market for it.

4. The fourth step is to develop a business plan that outlines the financial aspects of the product, including costs, revenue, and profit.

5. The fifth step is to secure funding for the product, which may involve seeking investors or applying for loans.

6. The sixth step is to manufacture the product, which involves sourcing materials and hiring workers.

7. The seventh step is to distribute the product, which involves finding retailers or distributors to sell the product.

8. The eighth step is to promote the product, which involves creating a marketing campaign to attract customers.

9. The ninth step is to monitor the product's performance, which involves tracking sales and customer feedback.

10. The tenth step is to iterate on the product, which involves making improvements based on customer feedback and market trends.

11. The eleventh step is to scale the product, which involves increasing production and distribution to reach a larger market.

12. The twelfth step is to maintain the product, which involves ongoing marketing and customer support.

13. The thirteenth step is to evaluate the product's success, which involves comparing sales and profit to the original goals.

14. The fourteenth step is to plan for the future, which involves identifying new market opportunities and developing strategies to address them.

15. The fifteenth step is to celebrate the success of the product, which involves recognizing the team's hard work and the product's impact on the market.

16. The sixteenth step is to continue to innovate, which involves staying up-to-date on market trends and developing new products to meet changing consumer needs.

17. The seventeenth step is to build a strong brand, which involves creating a unique identity for the product and its company.

18. The eighteenth step is to establish a strong customer base, which involves providing excellent customer service and building relationships with customers.

19. The nineteenth step is to expand into new markets, which involves identifying new geographic areas and developing strategies to enter them.

20. The twentieth step is to maintain a competitive edge, which involves staying ahead of the competition by continuously improving the product and the company's operations.

21. The twenty-first step is to build a strong financial foundation, which involves managing the company's finances effectively and ensuring long-term sustainability.

22. The twenty-second step is to foster a strong company culture, which involves creating a positive work environment and encouraging employee growth and development.

23. The twenty-third step is to build a strong network, which involves establishing relationships with industry professionals and organizations.

24. The twenty-fourth step is to stay up-to-date on industry trends, which involves regularly researching and analyzing market data.

25. The twenty-fifth step is to remain flexible and adaptable, which involves being open to change and adjusting the company's strategy as needed.

1. The first part of the document is a list of the names of the persons who have been appointed to the various positions of the Board of Directors of the Corporation. The names are listed in alphabetical order, and each name is followed by the position to which he or she has been appointed.

2. The second part of the document is a list of the names of the persons who have been appointed to the various positions of the Board of Directors of the Corporation. The names are listed in alphabetical order, and each name is followed by the position to which he or she has been appointed.

3. The third part of the document is a list of the names of the persons who have been appointed to the various positions of the Board of Directors of the Corporation. The names are listed in alphabetical order, and each name is followed by the position to which he or she has been appointed.

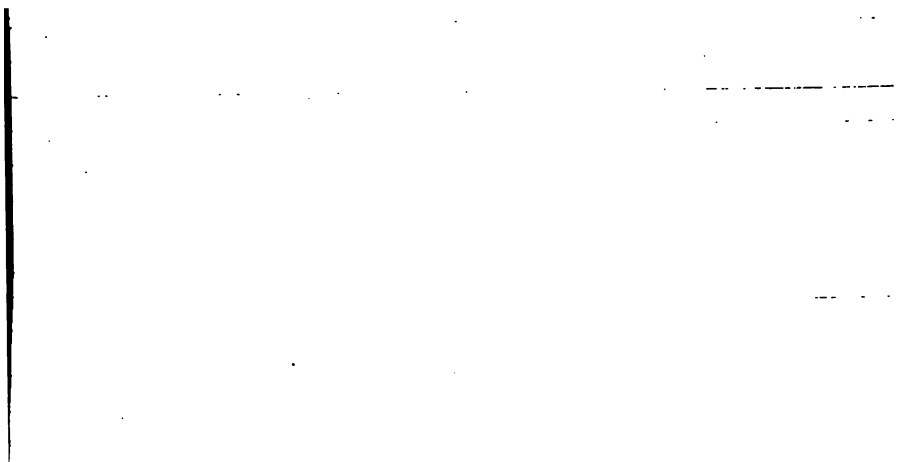
4. The fourth part of the document is a list of the names of the persons who have been appointed to the various positions of the Board of Directors of the Corporation. The names are listed in alphabetical order, and each name is followed by the position to which he or she has been appointed.

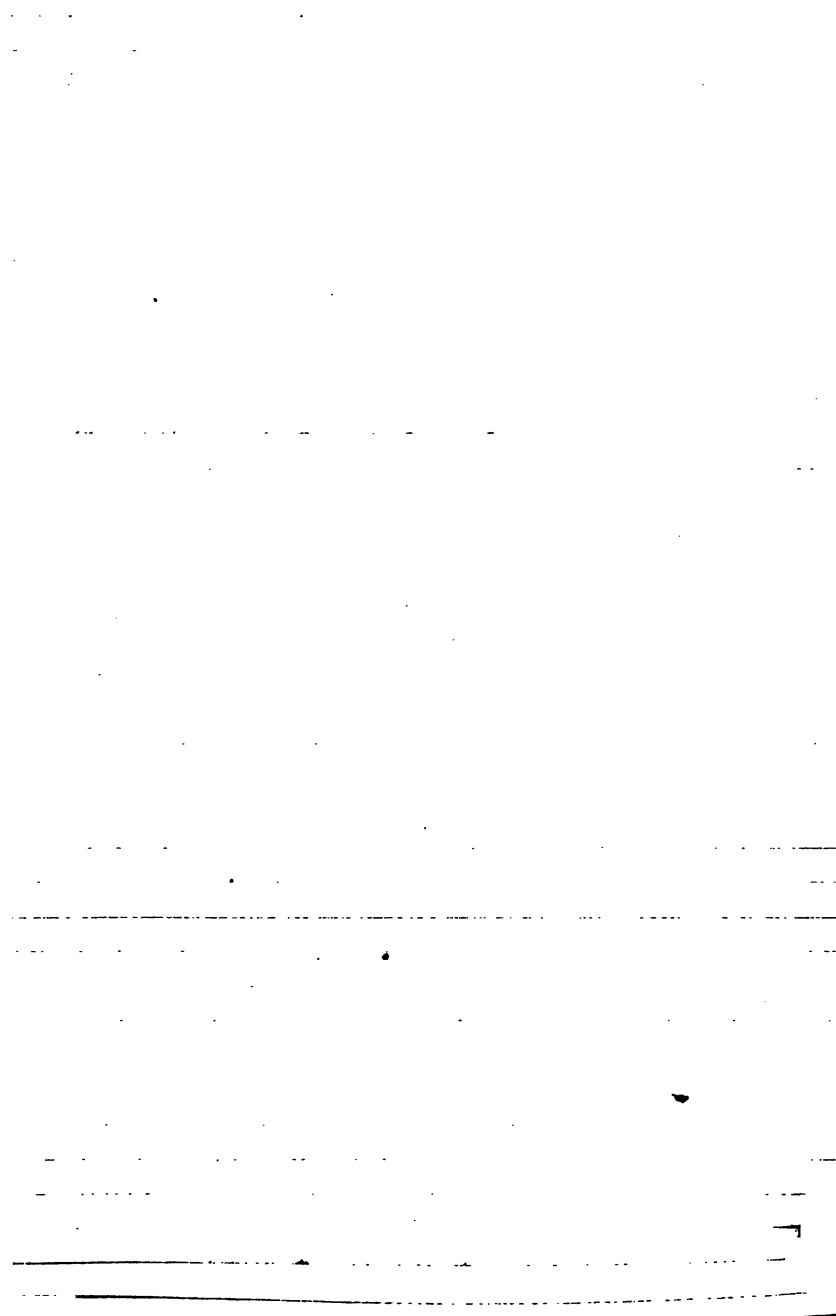
5. The fifth part of the document is a list of the names of the persons who have been appointed to the various positions of the Board of Directors of the Corporation. The names are listed in alphabetical order, and each name is followed by the position to which he or she has been appointed.

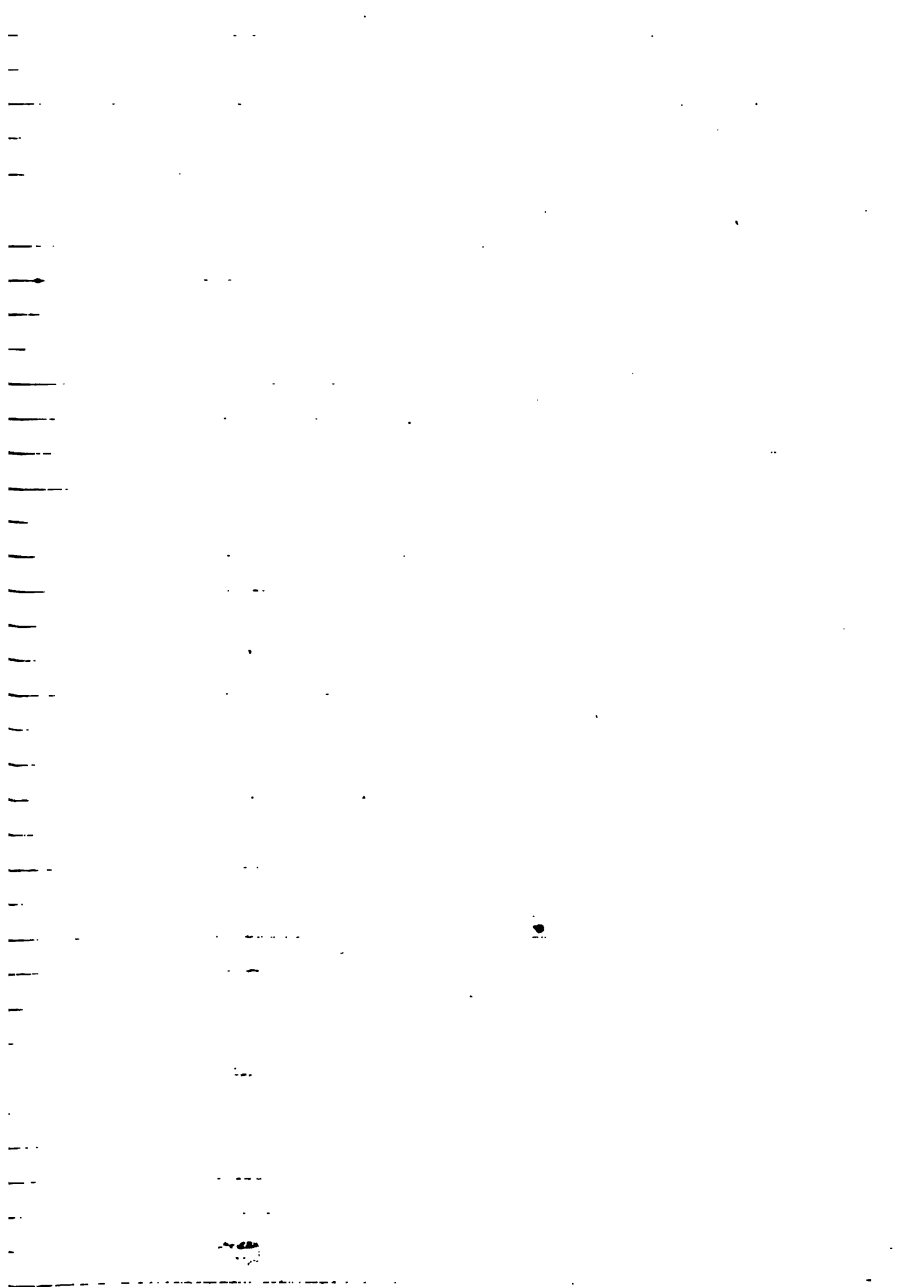
6. The sixth part of the document is a list of the names of the persons who have been appointed to the various positions of the Board of Directors of the Corporation. The names are listed in alphabetical order, and each name is followed by the position to which he or she has been appointed.

7. The seventh part of the document is a list of the names of the persons who have been appointed to the various positions of the Board of Directors of the Corporation. The names are listed in alphabetical order, and each name is followed by the position to which he or she has been appointed.









1. The first part of the document is a list of names and dates, arranged in a table. The names are written in a cursive script, and the dates are in a standard font. The table has two columns: the first column contains the names, and the second column contains the dates. The names are: John Smith, James Brown, and William Jones. The dates are: 1810, 1811, and 1812. The table is as follows:

Name	Date
John Smith	1810
James Brown	1811
William Jones	1812









[The page contains faint horizontal lines, likely representing a table or form, but no legible text is visible.]



1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243	244	245	246	247	248	249	250	251	252	253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269	270	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288	289	290	291	292	293	294	295	296	297	298	299	300	301	302	303	304	305	306	307	308	309	310	311	312	313	314	315	316	317	318	319	320	321	322	323	324	325	326	327	328	329	330	331	332	333	334	335	336	337	338	339	340	341	342	343	344	345	346	347	348	349	350	351	352	353	354	355	356	357	358	359	360	361	362	363	364	365	366	367	368	369	370	371	372	373	374	375	376	377	378	379	380	381	382	383	384	385	386	387	388	389	390	391	392	393	394	395	396	397	398	399	400	401	402	403	404	405	406	407	408	409	410	411	412	413	414	415	416	417	418	419	420	421	422	423	424	425	426	427	428	429	430	431	432	433	434	435	436	437	438	439	440	441	442	443	444	445	446	447	448	449	450	451	452	453	454	455	456	457	458	459	460	461	462	463	464	465	466	467	468	469	470	471	472	473	474	475	476	477	478	479	480	481	482	483	484	485	486	487	488	489	490	491	492	493	494	495	496	497	498	499	500	501	502	503	504	505	506	507	508	509	510	511	512	513	514	515	516	517	518	519	520	521	522	523	524	525	526	527	528	529	530	531	532	533	534	535	536	537	538	539	540	541	542	543	544	545	546	547	548	549	550	551	552	553	554	555	556	557	558	559	560	561	562	563	564	565	566	567	568	569	570	571	572	573	574	575	576	577	578	579	580	581	582	583	584	585	586	587	588	589	590	591	592	593	594	595	596	597	598	599	600	601	602	603	604	605	606	607	608	609	610	611	612	613	614	615	616	617	618	619	620	621	622	623	624	625	626	627	628	629	630	631	632	633	634	635	636	637	638	639	640	641	642	643	644	645	646	647	648	649	650	651	652	653	654	655	656	657	658	659	660	661	662	663	664	665	666	667	668	669	670	671	672	673	674	675	676	677	678	679	680	681	682	683	684	685	686	687	688	689	690	691	692	693	694	695	696	697	698	699	700	701	702	703	704	705	706	707	708	709	710	711	712	713	714	715	716	717	718	719	720	721	722	723	724	725	726	727	728	729	730	731	732	733	734	735	736	737	738	739	740	741	742	743	744	745	746	747	748	749	750	751	752	753	754	755	756	757	758	759	760	761	762	763	764	765	766	767	768	769	770	771	772	773	774	775	776	777	778	779	780	781	782	783	784	785	786	787	788	789	790	791	792	793	794	795	796	797	798	799	800	801	802	803	804	805	806	807	808	809	810	811	812	813	814	815	816	817	818	819	820	821	822	823	824	825	826	827	828	829	830	831	832	833	834	835	836	837	838	839	840	841	842	843	844	845	846	847	848	849	850	851	852	853	854	855	856	857	858	859	860	861	862	863	864	865	866	867	868	869	870	871	872	873	874	875	876	877	878	879	880	881	882	883	884	885	886	887	888	889	890	891	892	893	894	895	896	897	898	899	900	901	902	903	904	905	906	907	908	909	910	911	912	913	914	915	916	917	918	919	920	921	922	923	924	925	926	927	928	929	930	931	932	933	934	935	936	937	938	939	940	941	942	943	944	945	946	947	948	949	950	951	952	953	954	955	956	957	958	959	960	961	962	963	964	965	966	967	968	969	970	971	972	973	974	975	976	977	978	979	980	981	982	983	984	985	986	987	988	989	990	991	992	993	994	995	996	997	998	999	1000	1001	1002	1003	1004	1005	1006	1007	1008	1009	1010	1011	1012	1013	1014	1015	1016	1017	1018	1019	1020	1021	1022	1023	1024	1025	1026	1027	1028	1029	1030	1031	1032	1033	1034	1035	1036	1037	1038	1039	1040	1041	1042	1043	1044	1045	1046	1047	1048	1049	1050	1051	1052	1053	1054	1055	1056	1057	1058	1059	1060	1061	1062	1063	1064	1065	1066	1067	1068	1069	1070	1071	1072	1073	1074	1075	1076	1077	1078	1079	1080	1081	1082	1083	1084	1085	1086	1087	1088	1089	1090	1091	1092	1093	1094	1095	1096	1097	1098	1099	1100	1101	1102	1103	1104	1105	1106	1107	1108	1109	1110	1111	1112	1113	1114	1115	1116	1117	1118	1119	1120	1121	1122	1123	1124	1125	1126	1127	1128	1129	1130	1131	1132	1133	1134	1135	1136	1137	1138	1139	1140	1141	1142	1143	1144	1145	1146	1147	1148	1149	1150	1151	1152	1153	1154	1155	1156	1157	1158	1159	1160	1161	1162	1163	1164	1165	1166	1167	1168	1169	1170	1171	1172	1173	1174	1175	1176	1177	1178	1179	1180	1181	1182	1183	1184	1185	1186	1187	1188	1189	1190	1191	1192	1193	1194	1195	1196	1197	1198	1199	1200	1201	1202	1203	1204	1205	1206	1207	1208	1209	1210	1211	1212	1213	1214	1215	1216	1217	1218	1219	1220	1221	1222	1223	1224	1225	1226	1227	1228	1229	1230	1231	1232	1233	1234	1235	1236	1237	1238	1239	1240	1241	1242	1243	1244	1245	1246	1247	1248	1249	1250	1251	1252	1253	1254	1255	1256	1257	1258	1259	1260	1261	1262	1263	1264	1265	1266	1267	1268	1269	1270	1271	1272	1273	1274	1275	1276	1277	1278	1279	1280	1281	1282	1283	1284	1285	1286	1287	1288	1289	1290	1291	1292	1293	1294	1295	1296	1297	1298	1299	1300	1301	1302	1303	1304	1305	1306	1307	1308	1309	1310	1311	1312	1313	1314	1315	1316	1317	1318	1319	1320	1321	1322	1323	1324	1325	1326	1327	1328	1329	1330	1331	1332	1333	1334	1335	1336	1337	1338	1339	1340	1341	1342	1343	1344	1345	1346	1347	1348	1349	1350	1351	1352	1353	1354	1355	1356	1357	1358	1359	1360	1361	1362	1363	1364	1365	1366	1367	1368	1369	1370	1371	1372	1373	1374	1375	1376	1377	1378	1379	1380	1381	1382	1383	1384	1385	1386	1387	1388	1389	1390	1391	1392	1393	1394	1395	1396	1397	1398	1399	1400	1401	1402	1403	1404	1405	1406	1407	1408	1409	1410	1411	1412	1413	1414	1415	1416	1417	1418	1419	1420	1421	1422	1423	1424	1425	1426	1427	1428	1429	1430	1431	1432	1433	1434	1435	1436	1437	1438	1439	1440	1441	1442	1443	1444	1445	1446	1447	1448	1449	1450	1451	1452	1453	1454	1455	1456	1457	1458	1459	1460	1461	1462	1463	1464	1465	1466	1467	1468	1469	1470	1471	1472	1473	1474	1475	1476	1477	1478	1479	1480	1481	1482	1483	1484	1485	1486	1487	1488	1489	1490	1491	1492	1493	1494	1495	14
---	---	---	---	---	---	---	---	---	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	----



1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

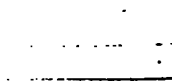
1000

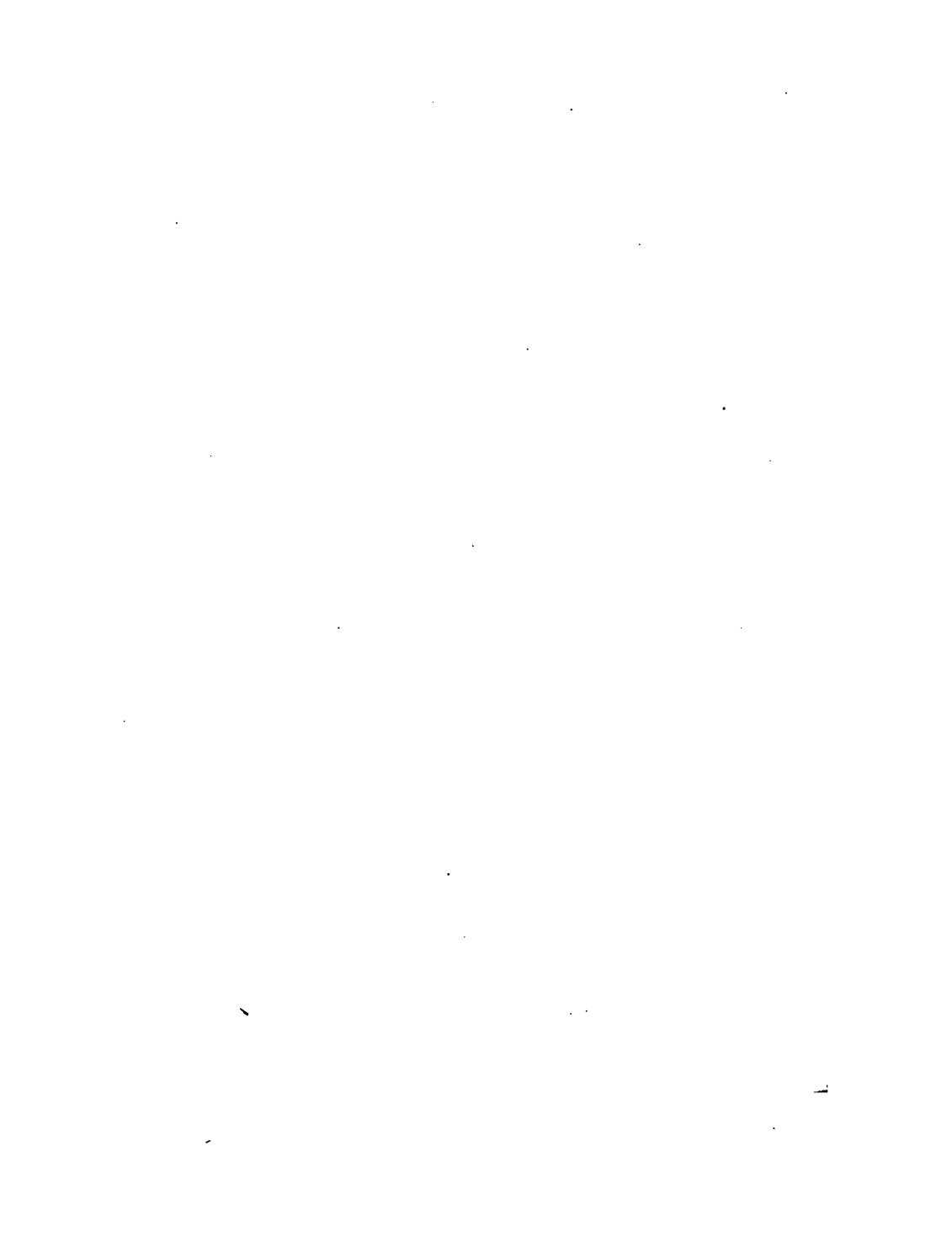
1000

1000









1

... ..

... ..

... ..

... ..

... ..

... ..

... ..

... ..

... ..

... ..

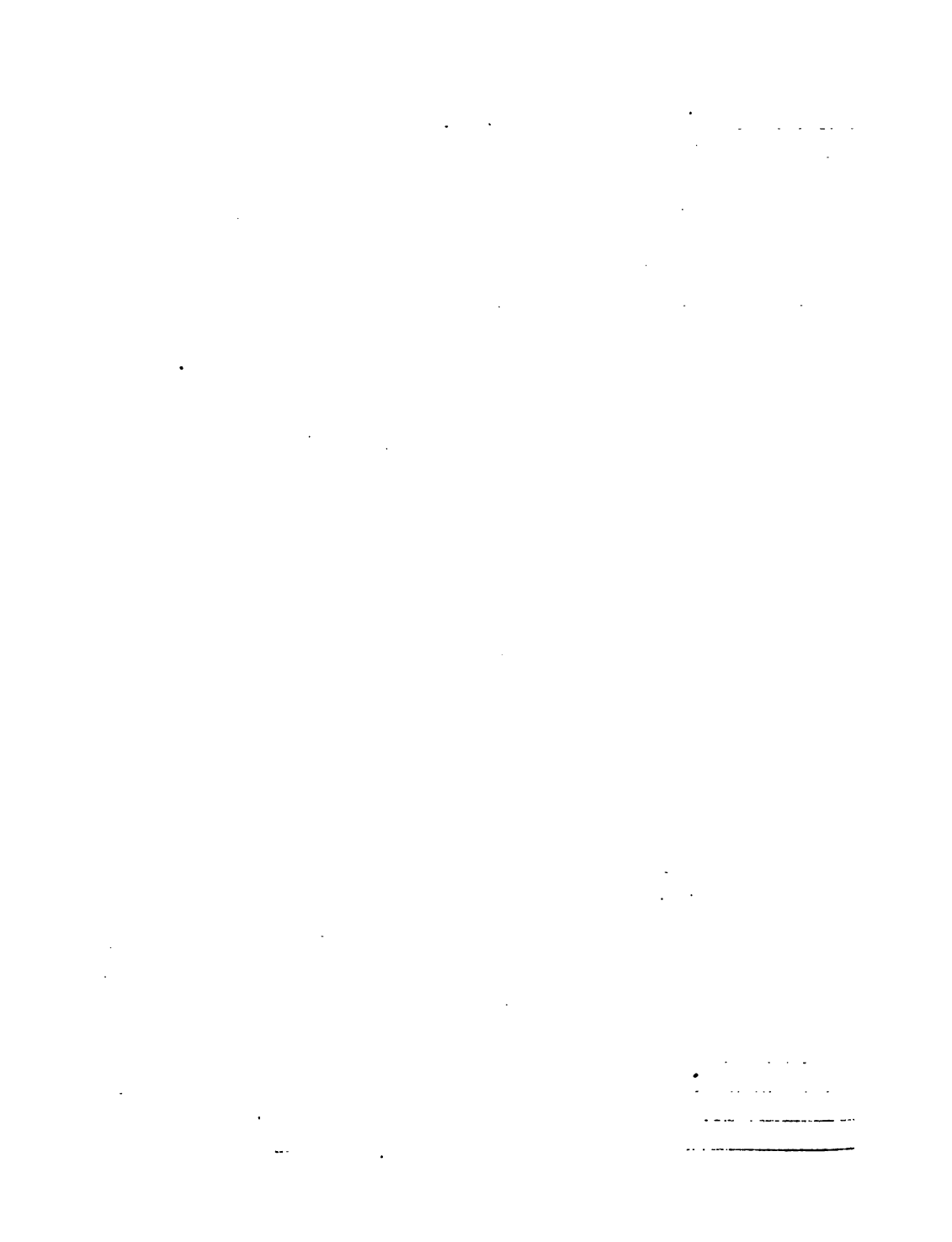
... ..

... ..

... ..

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243	244	245	246	247	248	249	250	251	252	253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269	270	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288	289	290	291	292	293	294	295	296	297	298	299	300	301	302	303	304	305	306	307	308	309	310	311	312	313	314	315	316	317	318	319	320	321	322	323	324	325	326	327	328	329	330	331	332	333	334	335	336	337	338	339	340	341	342	343	344	345	346	347	348	349	350	351	352	353	354	355	356	357	358	359	360	361	362	363	364	365	366	367	368	369	370	371	372	373	374	375	376	377	378	379	380	381	382	383	384	385	386	387	388	389	390	391	392	393	394	395	396	397	398	399	400	401	402	403	404	405	406	407	408	409	410	411	412	413	414	415	416	417	418	419	420	421	422	423	424	425	426	427	428	429	430	431	432	433	434	435	436	437	438	439	440	441	442	443	444	445	446	447	448	449	450	451	452	453	454	455	456	457	458	459	460	461	462	463	464	465	466	467	468	469	470	471	472	473	474	475	476	477	478	479	480	481	482	483	484	485	486	487	488	489	490	491	492	493	494	495	496	497	498	499	500	501	502	503	504	505	506	507	508	509	510	511	512	513	514	515	516	517	518	519	520	521	522	523	524	525	526	527	528	529	530	531	532	533	534	535	536	537	538	539	540	541	542	543	544	545	546	547	548	549	550	551	552	553	554	555	556	557	558	559	560	561	562	563	564	565	566	567	568	569	570	571	572	573	574	575	576	577	578	579	580	581	582	583	584	585	586	587	588	589	590	591	592	593	594	595	596	597	598	599	600	601	602	603	604	605	606	607	608	609	610	611	612	613	614	615	616	617	618	619	620	621	622	623	624	625	626	627	628	629	630	631	632	633	634	635	636	637	638	639	640	641	642	643	644	645	646	647	648	649	650	651	652	653	654	655	656	657	658	659	660	661	662	663	664	665	666	667	668	669	670	671	672	673	674	675	676	677	678	679	680	681	682	683	684	685	686	687	688	689	690	691	692	693	694	695	696	697	698	699	700	701	702	703	704	705	706	707	708	709	710	711	712	713	714	715	716	717	718	719	720	721	722	723	724	725	726	727	728	729	730	731	732	733	734	735	736	737	738	739	740	741	742	743	744	745	746	747	748	749	750	751	752	753	754	755	756	757	758	759	760	761	762	763	764	765	766	767	768	769	770	771	772	773	774	775	776	777	778	779	780	781	782	783	784	785	786	787	788	789	790	791	792	793	794	795	796	797	798	799	800	801	802	803	804	805	806	807	808	809	810	811	812	813	814	815	816	817	818	819	820	821	822	823	824	825	826	827	828	829	830	831	832	833	834	835	836	837	838	839	840	841	842	843	844	845	846	847	848	849	850	851	852	853	854	855	856	857	858	859	860	861	862	863	864	865	866	867	868	869	870	871	872	873	874	875	876	877	878	879	880	881	882	883	884	885	886	887	888	889	890	891	892	893	894	895	896	897	898	899	900	901	902	903	904	905	906	907	908	909	910	911	912	913	914	915	916	917	918	919	920	921	922	923	924	925	926	927	928	929	930	931	932	933	934	935	936	937	938	939	940	941	942	943	944	945	946	947	948	949	950	951	952	953	954	955	956	957	958	959	960	961	962	963	964	965	966	967	968	969	970	971	972	973	974	975	976	977	978	979	980	981	982	983	984	985	986	987	988	989	990	991	992	993	994	995	996	997	998	999	1000	1001	1002	1003	1004	1005	1006	1007	1008	1009	1010	1011	1012	1013	1014	1015	1016	1017	1018	1019	1020	1021	1022	1023	1024	1025	1026	1027	1028	1029	1030	1031	1032	1033	1034	1035	1036	1037	1038	1039	1040	1041	1042	1043	1044	1045	1046	1047	1048	1049	1050	1051	1052	1053	1054	1055	1056	1057	1058	1059	1060	1061	1062	1063	1064	1065	1066	1067	1068	1069	1070	1071	1072	1073	1074	1075	1076	1077	1078	1079	1080	1081	1082	1083	1084	1085	1086	1087	1088	1089	1090	1091	1092	1093	1094	1095	1096	1097	1098	1099	1100	1101	1102	1103	1104	1105	1106	1107	1108	1109	1110	1111	1112	1113	1114	1115	1116	1117	1118	1119	1120	1121	1122	1123	1124	1125	1126	1127	1128	1129	1130	1131	1132	1133	1134	1135	1136	1137	1138	1139	1140	1141	1142	1143	1144	1145	1146	1147	1148	1149	1150	1151	1152	1153	1154	1155	1156	1157	1158	1159	1160	1161	1162	1163	1164	1165	1166	1167	1168	1169	1170	1171	1172	1173	1174	1175	1176	1177	1178	1179	1180	1181	1182	1183	1184	1185	1186	1187	1188	1189	1190	1191	1192	1193	1194	1195	1196	1197	1198	1199	1200	1201	1202	1203	1204	1205	1206	1207	1208	1209	1210	1211	1212	1213	1214	1215	1216	1217	1218	1219	1220	1221	1222	1223	1224	1225	1226	1227	1228	1229	1230	1231	1232	1233	1234	1235	1236	1237	1238	1239	1240	1241	1242	1243	1244	1245	1246	1247	1248	1249	1250	1251	1252	1253	1254	1255	1256	1257	1258	1259	1260	1261	1262	1263	1264	1265	1266	1267	1268	1269	1270	1271	1272	1273	1274	1275	1276	1277	1278	1279	1280	1281	1282	1283	1284	1285	1286	1287	1288	1289	1290	1291	1292	1293	1294	1295	1296	1297	1298	1299	1300	1301	1302	1303	1304	1305	1306	1307	1308	1309	1310	1311	1312	1313	1314	1315	1316	1317	1318	1319	1320	1321	1322	1323	1324	1325	1326	1327	1328	1329	1330	1331	1332	1333	1334	1335	1336	1337	1338	1339	1340	1341	1342	1343	1344	1345	1346	1347	1348	1349	1350	1351	1352	1353	1354	1355	1356	1357	1358	1359	1360	1361	1362	1363	1364	1365	1366	1367	1368	1369	1370	1371	1372	1373	1374	1375	1376	1377	1378	1379	1380	1381	1382	1383	1384	1385	1386	1387	1388	1389	1390	1391	1392	1393	1394	1395	1396	1397	1398	1399	1400	1401	1402	1403	1404	1405	1406	1407	1408	1409	1410	1411	1412	1413	1414	1415	1416	1417	1418	1419	1420	1421	1422	1423	1424	1425	1426	1427	1428	1429	1430	1431	1432	1433	1434	1435	1436	1437	1438	1439	1440	1441	1442	1443	1444	1445	1446	1447	1448	1449	1450	1451	1452	1453	1454	1455	1456	1457	1458	1459	1460	1461	1462	1463	1464	1465	1466	1467	1468	1469	1470	1471	1472	1473	1474	1475	1476	1477	1478	1479	1480	1481	1482	1483	1484	1485	1486	1487	1488	1489	1490	1491	1492	1493	1494	1495	14
---	---	---	---	---	---	---	---	---	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	----





— — — — —
— — — — —

—
—

1. The first part of the document is a list of the names of the persons who have been appointed to the various offices of the city of New York.

2.

3.

4.

5.

6.

1. The first part of the document discusses the importance of maintaining accurate records of all transactions and activities. It emphasizes that proper record-keeping is essential for transparency and accountability, particularly in financial matters. The text notes that without reliable records, it is difficult to track progress, identify trends, and make informed decisions.

2. The second part of the document outlines the various methods and tools used to collect and analyze data. It mentions the use of surveys, interviews, and focus groups to gather qualitative information, as well as statistical software and data visualization techniques for quantitative analysis. The importance of ensuring the reliability and validity of the data is stressed throughout this section.

3. The third part of the document provides a detailed overview of the findings from the study. It presents a series of tables and graphs that illustrate the key results, including trends over time and comparisons between different groups. The text explains the significance of these findings and how they relate to the research objectives.

4. The fourth part of the document discusses the implications of the findings and offers recommendations for future research and practice. It suggests that the results indicate a need for further investigation into certain areas and provides practical advice on how to apply the findings in real-world contexts. The document concludes by emphasizing the importance of ongoing monitoring and evaluation to ensure continued success.



1. The first part of the document is a letter from the President of the United States to the Congress, dated January 1, 1861. It is a very important document, as it sets out the President's policy for the new year. The President states that he is pleased to see the Congress assembled, and that he is confident that the country is in a good state of affairs. He also mentions the recent election of Abraham Lincoln as President, and expresses his confidence in the new administration.

2. The second part of the document is a letter from the Vice President of the United States to the Congress, dated January 1, 1861. It is a very important document, as it sets out the Vice President's policy for the new year. The Vice President states that he is pleased to see the Congress assembled, and that he is confident that the country is in a good state of affairs. He also mentions the recent election of Abraham Lincoln as President, and expresses his confidence in the new administration.

3. The third part of the document is a letter from the Secretary of the United States to the Congress, dated January 1, 1861. It is a very important document, as it sets out the Secretary's policy for the new year. The Secretary states that he is pleased to see the Congress assembled, and that he is confident that the country is in a good state of affairs. He also mentions the recent election of Abraham Lincoln as President, and expresses his confidence in the new administration.

4. The fourth part of the document is a letter from the Attorney General of the United States to the Congress, dated January 1, 1861. It is a very important document, as it sets out the Attorney General's policy for the new year. The Attorney General states that he is pleased to see the Congress assembled, and that he is confident that the country is in a good state of affairs. He also mentions the recent election of Abraham Lincoln as President, and expresses his confidence in the new administration.

5. The fifth part of the document is a letter from the Secretary of the Navy to the Congress, dated January 1, 1861. It is a very important document, as it sets out the Secretary's policy for the new year. The Secretary states that he is pleased to see the Congress assembled, and that he is confident that the country is in a good state of affairs. He also mentions the recent election of Abraham Lincoln as President, and expresses his confidence in the new administration.

6. The sixth part of the document is a letter from the Secretary of the War to the Congress, dated January 1, 1861. It is a very important document, as it sets out the Secretary's policy for the new year. The Secretary states that he is pleased to see the Congress assembled, and that he is confident that the country is in a good state of affairs. He also mentions the recent election of Abraham Lincoln as President, and expresses his confidence in the new administration.

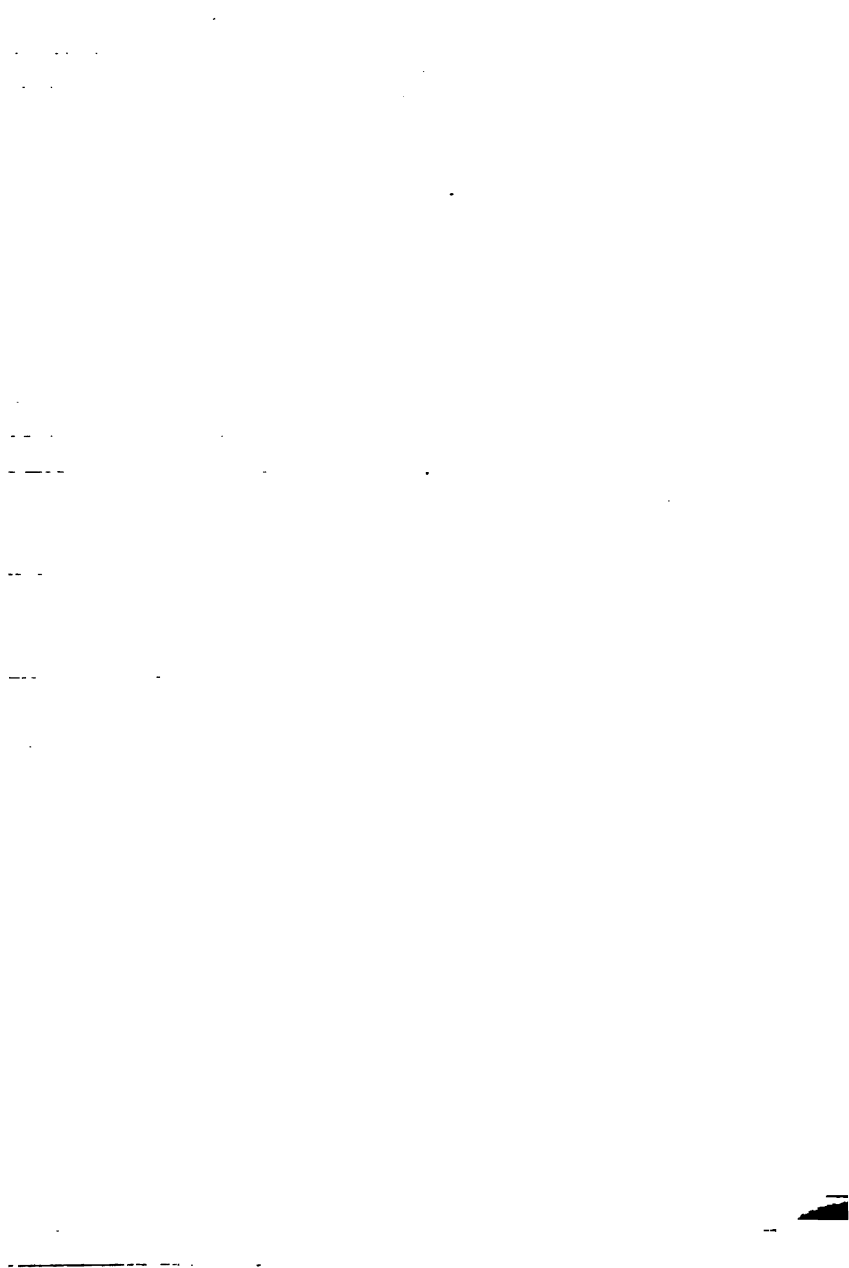
7. The seventh part of the document is a letter from the Secretary of the Treasury to the Congress, dated January 1, 1861. It is a very important document, as it sets out the Secretary's policy for the new year. The Secretary states that he is pleased to see the Congress assembled, and that he is confident that the country is in a good state of affairs. He also mentions the recent election of Abraham Lincoln as President, and expresses his confidence in the new administration.

8. The eighth part of the document is a letter from the Secretary of the Interior to the Congress, dated January 1, 1861. It is a very important document, as it sets out the Secretary's policy for the new year. The Secretary states that he is pleased to see the Congress assembled, and that he is confident that the country is in a good state of affairs. He also mentions the recent election of Abraham Lincoln as President, and expresses his confidence in the new administration.

9. The ninth part of the document is a letter from the Secretary of the Education to the Congress, dated January 1, 1861. It is a very important document, as it sets out the Secretary's policy for the new year. The Secretary states that he is pleased to see the Congress assembled, and that he is confident that the country is in a good state of affairs. He also mentions the recent election of Abraham Lincoln as President, and expresses his confidence in the new administration.

10. The tenth part of the document is a letter from the Secretary of the Agriculture to the Congress, dated January 1, 1861. It is a very important document, as it sets out the Secretary's policy for the new year. The Secretary states that he is pleased to see the Congress assembled, and that he is confident that the country is in a good state of affairs. He also mentions the recent election of Abraham Lincoln as President, and expresses his confidence in the new administration.

11. The eleventh part of the document is a letter from the Secretary of the Commerce to the Congress, dated January 1, 1861. It is a very important document, as it sets out the Secretary's policy for the new year. The Secretary states that he is pleased to see the Congress assembled, and that he is confident that the country is in a good state of affairs. He also mentions the recent election of Abraham Lincoln as President, and expresses his confidence in the new administration.



7

1

1. The first part of the document is a list of the names of the persons who have been appointed to the various offices of the city government. The names are listed in alphabetical order, and each name is followed by the name of the office to which the person has been appointed.

2. The second part of the document is a list of the names of the persons who have been appointed to the various offices of the city government. The names are listed in alphabetical order, and each name is followed by the name of the office to which the person has been appointed.

3. The third part of the document is a list of the names of the persons who have been appointed to the various offices of the city government. The names are listed in alphabetical order, and each name is followed by the name of the office to which the person has been appointed.

4. The fourth part of the document is a list of the names of the persons who have been appointed to the various offices of the city government. The names are listed in alphabetical order, and each name is followed by the name of the office to which the person has been appointed.

5. The fifth part of the document is a list of the names of the persons who have been appointed to the various offices of the city government. The names are listed in alphabetical order, and each name is followed by the name of the office to which the person has been appointed.

6. The sixth part of the document is a list of the names of the persons who have been appointed to the various offices of the city government. The names are listed in alphabetical order, and each name is followed by the name of the office to which the person has been appointed.

7. The seventh part of the document is a list of the names of the persons who have been appointed to the various offices of the city government. The names are listed in alphabetical order, and each name is followed by the name of the office to which the person has been appointed.

8. The eighth part of the document is a list of the names of the persons who have been appointed to the various offices of the city government. The names are listed in alphabetical order, and each name is followed by the name of the office to which the person has been appointed.

1000



1000

1

1000

1000

1000

1000

1. The first part of the document discusses the importance of maintaining accurate records of all transactions and activities. It emphasizes the need for transparency and accountability in financial reporting.

2. The second part of the document outlines the various methods and techniques used to collect and analyze data. It includes a detailed description of the experimental procedures and the statistical analysis performed.

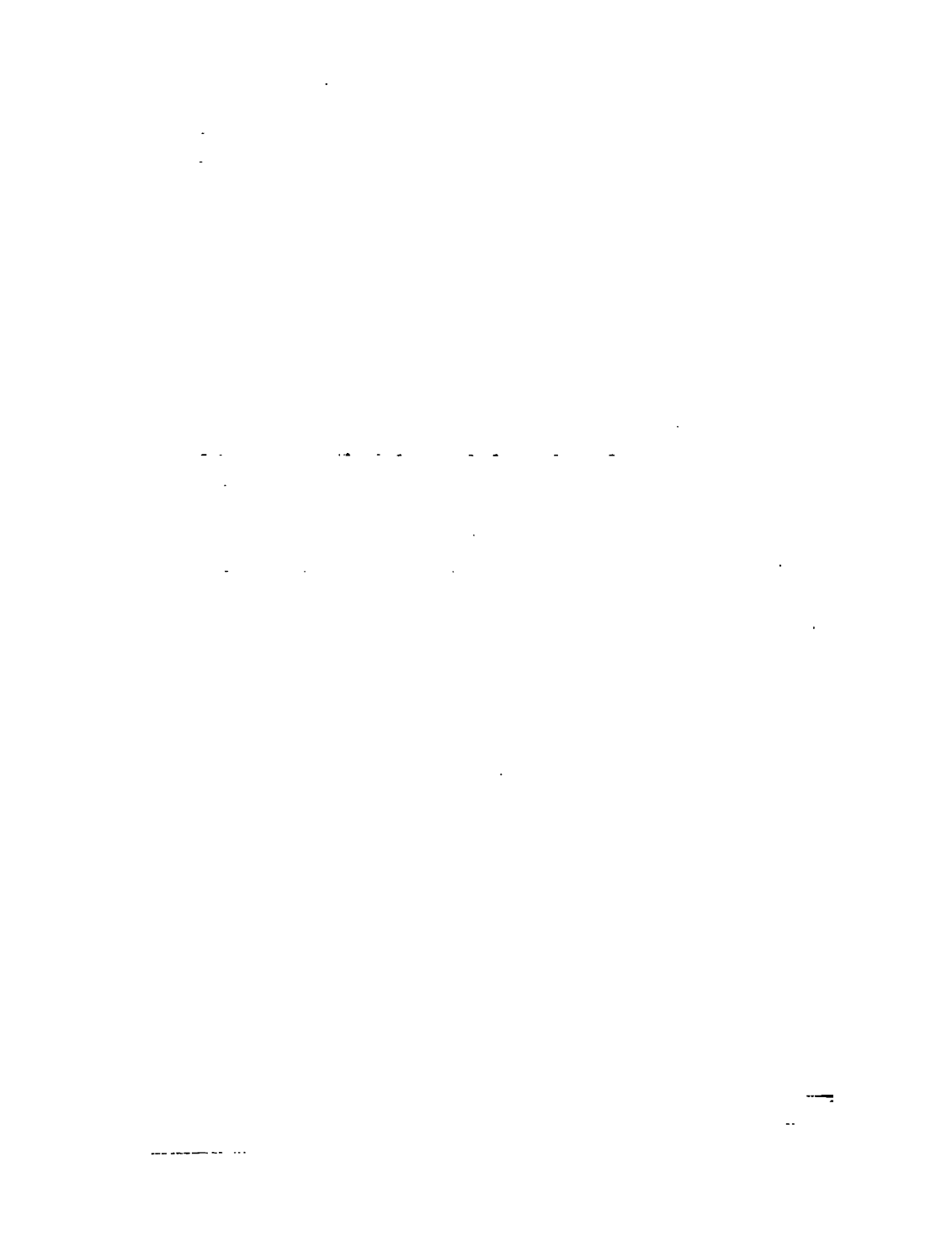
3. The third part of the document presents the results of the study, including a comparison of the experimental findings with the theoretical predictions. It also discusses the implications of the results for future research.

4. The fourth part of the document provides a conclusion and a summary of the key findings. It also includes a list of references and a bibliography of the sources used in the study.

5. The fifth part of the document contains a list of appendices, including a detailed description of the experimental setup and a list of the data collected during the study.



1



1

2

3

4

5





100

100

100

100

100

100

100

100

100

100

100

100

100

100

100

100

100

100

Date	Time	Description
1911	10:00	Left for the day
1911	10:00	Left for the day
1911	10:00	Left for the day
1911	10:00	Left for the day
1911	10:00	Left for the day
1911	10:00	Left for the day
1911	10:00	Left for the day
1911	10:00	Left for the day
1911	10:00	Left for the day
1911	10:00	Left for the day
1911	10:00	Left for the day
1911	10:00	Left for the day
1911	10:00	Left for the day
1911	10:00	Left for the day
1911	10:00	Left for the day
1911	10:00	Left for the day
1911	10:00	Left for the day
1911	10:00	Left for the day
1911	10:00	Left for the day
1911	10:00	Left for the day
1911	10:00	Left for the day
1911	10:00	Left for the day
1911	10:00	Left for the day
1911	10:00	Left for the day
1911	10:00	Left for the day
1911	10:00	Left for the day
1911	10:00	Left for the day
1911	10:00	Left for the day
1911	10:00	Left for the day
1911	10:00	Left for the day
1911	10:00	Left for the day
1911	10:00	Left for the day
1911	10:00	Left for the day
1911	10:00	Left for the day

1. 2. 3. 4. 5. 6. 7. 8. 9. 10. 11. 12. 13. 14. 15. 16. 17. 18. 19. 20. 21. 22. 23. 24. 25. 26. 27. 28. 29. 30. 31. 32. 33. 34. 35. 36. 37. 38. 39. 40. 41. 42. 43. 44. 45. 46. 47. 48. 49. 50. 51. 52. 53. 54. 55. 56. 57. 58. 59. 60. 61. 62. 63. 64. 65. 66. 67. 68. 69. 70. 71. 72. 73. 74. 75. 76. 77. 78. 79. 80. 81. 82. 83. 84. 85. 86. 87. 88. 89. 90. 91. 92. 93. 94. 95. 96. 97. 98. 99. 100. 101. 102. 103. 104. 105. 106. 107. 108. 109. 110. 111. 112. 113. 114. 115. 116. 117. 118. 119. 120. 121. 122. 123. 124. 125. 126. 127. 128. 129. 130. 131. 132. 133. 134. 135. 136. 137. 138. 139. 140. 141. 142. 143. 144. 145. 146. 147. 148. 149. 150. 151. 152. 153. 154. 155. 156. 157. 158. 159. 160. 161. 162. 163. 164. 165. 166. 167. 168. 169. 170. 171. 172. 173. 174. 175. 176. 177. 178. 179. 180. 181. 182. 183. 184. 185. 186. 187. 188. 189. 190. 191. 192. 193. 194. 195. 196. 197. 198. 199. 200. 201. 202. 203. 204. 205. 206. 207. 208. 209. 210. 211. 212. 213. 214. 215. 216. 217. 218. 219. 220. 221. 222. 223. 224. 225. 226. 227. 228. 229. 230. 231. 232. 233. 234. 235. 236. 237. 238. 239. 240. 241. 242. 243. 244. 245. 246. 247. 248. 249. 250. 251. 252. 253. 254. 255. 256. 257. 258. 259. 260. 261. 262. 263. 264. 265. 266. 267. 268. 269. 270. 271. 272. 273. 274. 275. 276. 277. 278. 279. 280. 281. 282. 283. 284. 285. 286. 287. 288. 289. 290. 291. 292. 293. 294. 295. 296. 297. 298. 299. 300. 301. 302. 303. 304. 305. 306. 307. 308. 309. 310. 311. 312. 313. 314. 315. 316. 317. 318. 319. 320. 321. 322. 323. 324. 325. 326. 327. 328. 329. 330. 331. 332. 333. 334. 335. 336. 337. 338. 339. 340. 341. 342. 343. 344. 345. 346. 347. 348. 349. 350. 351. 352. 353. 354. 355. 356. 357. 358. 359. 360. 361. 362. 363. 364. 365. 366. 367. 368. 369. 370. 371. 372. 373. 374. 375. 376. 377. 378. 379. 380. 381. 382. 383. 384. 385. 386. 387. 388. 389. 390. 391. 392. 393. 394. 395. 396. 397. 398. 399. 400. 401. 402. 403. 404. 405. 406. 407. 408. 409. 410. 411. 412. 413. 414. 415. 416. 417. 418. 419. 420. 421. 422. 423. 424. 425. 426. 427. 428. 429. 430. 431. 432. 433. 434. 435. 436. 437. 438. 439. 440. 441. 442. 443. 444. 445. 446. 447. 448. 449. 450. 451. 452. 453. 454. 455. 456. 457. 458. 459. 460. 461. 462. 463. 464. 465. 466. 467. 468. 469. 470. 471. 472. 473. 474. 475. 476. 477. 478. 479. 480. 481. 482. 483. 484. 485. 486. 487. 488. 489. 490. 491. 492. 493. 494. 495. 496. 497. 498. 499. 500. 501. 502. 503. 504. 505. 506. 507. 508. 509. 510. 511. 512. 513. 514. 515. 516. 517. 518. 519. 520. 521. 522. 523. 524. 525. 526. 527. 528. 529. 530. 531. 532. 533. 534. 535. 536. 537. 538. 539. 540. 541. 542. 543. 544. 545. 546. 547. 548. 549. 550. 551. 552. 553. 554. 555. 556. 557. 558. 559. 560. 561. 562. 563. 564. 565. 566. 567. 568. 569. 570. 571. 572. 573. 574. 575. 576. 577. 578. 579. 580. 581. 582. 583. 584. 585. 586. 587. 588. 589. 590. 591. 592. 593. 594. 595. 596. 597. 598. 599. 600. 601. 602. 603. 604. 605. 606. 607. 608. 609. 610. 611. 612. 613. 614. 615. 616. 617. 618. 619. 620. 621. 622. 623. 624. 625. 626. 627. 628. 629. 630. 631. 632. 633. 634. 635. 636. 637. 638. 639. 640. 641. 642. 643. 644. 645. 646. 647. 648. 649. 650. 651. 652. 653. 654. 655. 656. 657. 658. 659. 660. 661. 662. 663. 664. 665. 666. 667. 668. 669. 670. 671. 672. 673. 674. 675. 676. 677. 678. 679. 680. 681. 682. 683. 684. 685. 686. 687. 688. 689. 690. 691. 692. 693. 694. 695. 696. 697. 698. 699. 700. 701. 702. 703. 704. 705. 706. 707. 708. 709. 710. 711. 712. 713. 714. 715. 716. 717. 718. 719. 720. 721. 722. 723. 724. 725. 726. 727. 728. 729. 730. 731. 732. 733. 734. 735. 736. 737. 738. 739. 740. 741. 742. 743. 744. 745. 746. 747. 748. 749. 750. 751. 752. 753. 754. 755. 756. 757. 758. 759. 760. 761. 762. 763. 764. 765. 766. 767. 768. 769. 770. 771. 772. 773. 774. 775. 776. 777. 778. 779. 780. 781. 782. 783. 784. 785. 786. 787. 788. 789. 790. 791. 792. 793. 794. 795. 796. 797. 798. 799. 800. 801. 802. 803. 804. 805. 806. 807. 808. 809. 810. 811. 812. 813. 814. 815. 816. 817. 818. 819. 820. 821. 822. 823. 824. 825. 826. 827. 828. 829. 830. 831. 832. 833. 834. 835. 836. 837. 838. 839. 840.

Figure 1. The effect of the concentration of the *Agrobacterium* suspension on the transformation efficiency of *Agrobacterium* strains.

.....
.....
.....
.....

17

.....
.....
.....
.....

18

19

20

21

22

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

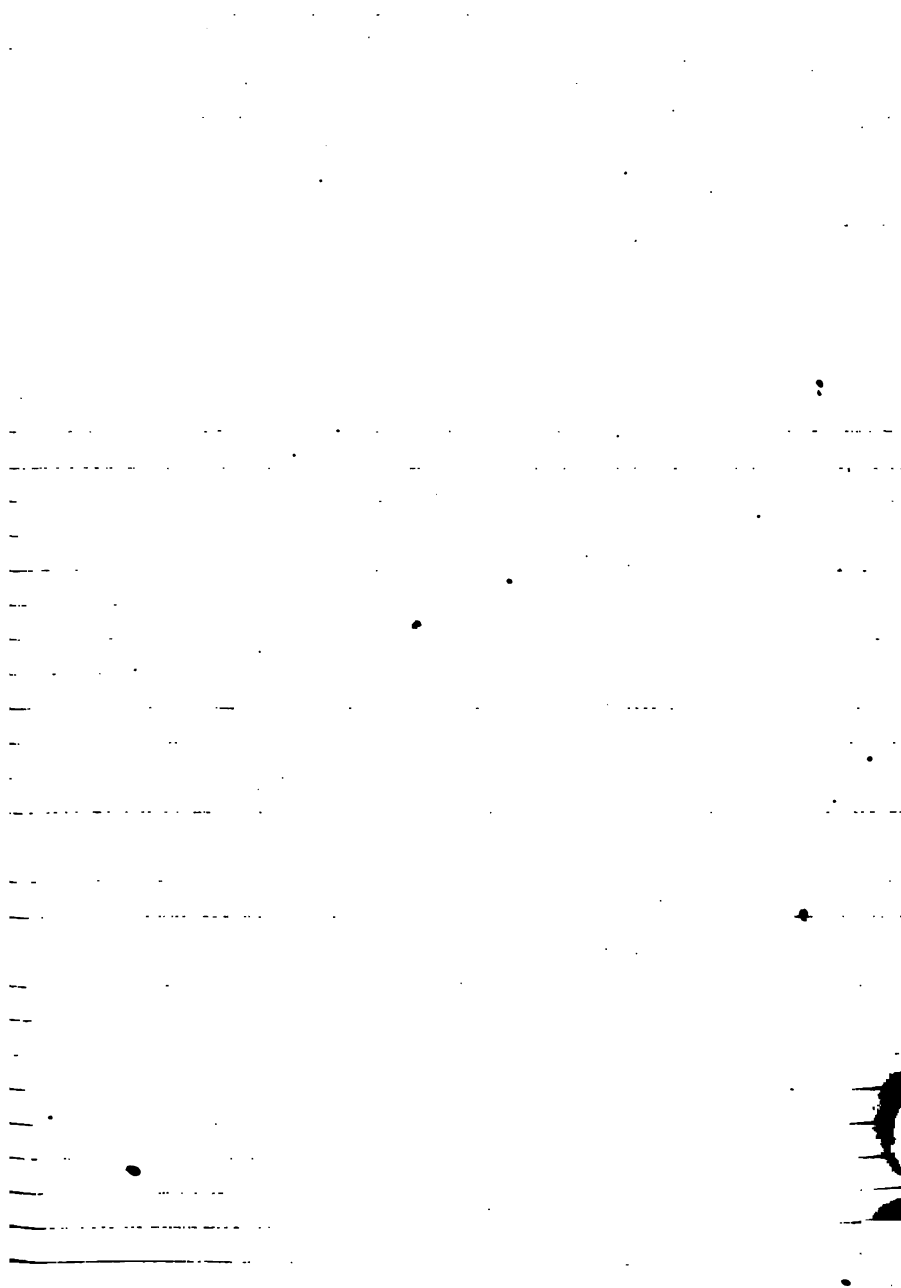
.....

.....

.....
.....
.....
.....

.....
.....

.....
.....
.....



1000000000

1000000000

1000000000

1000000000

1000000000

1000000000

1000000000

1000000000

1000000000

1000000000

1000000000

1000000000

1000000000

1000000000

1000000000

1000000000

1000000000

1000000000

1000000000

1000000000

1000000000

1000000000

1000000000

1000000000

1000000000

1000000000

1000000000

1000000000

[illegible]

doi:10.1371/journal.pone.0142000.g001

Abstract



11-11-2019 10:00 AM

11-11-2019 10:00 AM

11-11-2019 10:00 AM

11-11-2019 10:00 AM

11-11-2019 10:00 AM

11-11-2019 10:00 AM

11-11-2019 10:00 AM

11-11-2019 10:00 AM

11-11-2019 10:00 AM

11-11-2019 10:00 AM

11-11-2019 10:00 AM

11-11-2019 10:00 AM

11-11-2019 10:00 AM

11-11-2019 10:00 AM

11-11-2019 10:00 AM

11-11-2019 10:00 AM

11-11-2019 10:00 AM

11-11-2019 10:00 AM

11-11-2019 10:00 AM

11-11-2019 10:00 AM

11-11-2019 10:00 AM

11-11-2019 10:00 AM

11-11-2019 10:00 AM

11-11-2019 10:00 AM

11-11-2019 10:00 AM

11-11-2019 10:00 AM

11-11-2019 10:00 AM

11-11-2019 10:00 AM

11-11-2019 10:00 AM

11-11-2019 10:00 AM

11-11-2019 10:00 AM

11-11-2019 10:00 AM

11-11-2019 10:00 AM

11-11-2019 10:00 AM

11-11-2019 10:00 AM

11-11-2019 10:00 AM

11-11-2019 10:00 AM

11-11-2019 10:00 AM

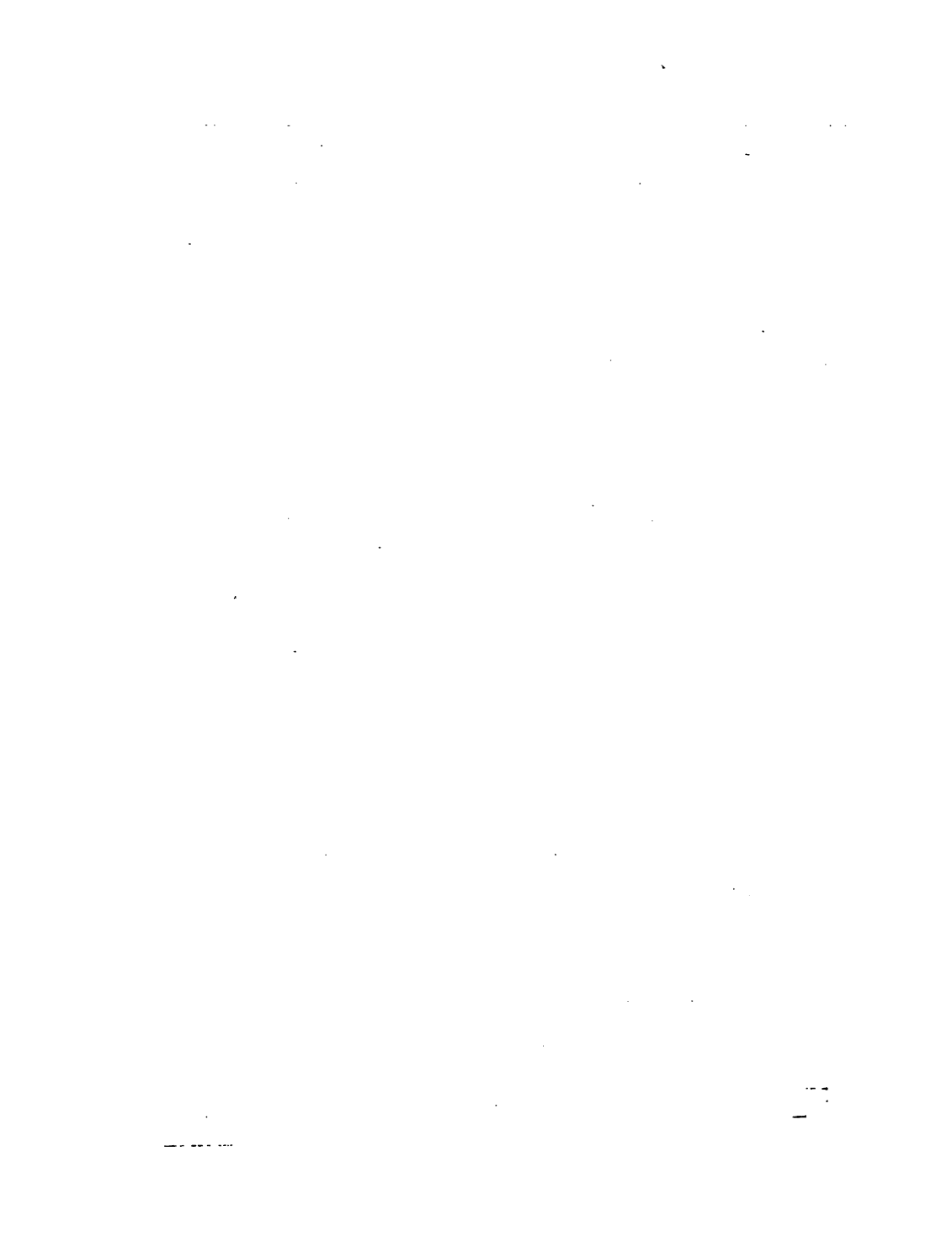
11-11-2019 10:00 AM

11-11-2019 10:00 AM

11-11-2019 10:00 AM









1. The first part of the document is a list of the names of the persons who have been appointed to the various positions of the Board of Directors of the Corporation. The names are listed in alphabetical order, and each name is followed by the position to which he has been appointed.

2. The second part of the document is a list of the names of the persons who have been appointed to the various positions of the Board of Directors of the Corporation. The names are listed in alphabetical order, and each name is followed by the position to which he has been appointed.

| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|----|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 | 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | 60 | 61 | 62 | 63 | 64 | 65 | 66 | 67 | 68 | 69 | 70 | 71 | 72 | 73 | 74 | 75 | 76 | 77 | 78 | 79 | 80 | 81 | 82 | 83 | 84 | 85 | 86 | 87 | 88 | 89 | 90 | 91 | 92 | 93 | 94 | 95 | 96 | 97 | 98 | 99 | 100 | 101 | 102 | 103 | 104 | 105 | 106 | 107 | 108 | 109 | 110 | 111 | 112 | 113 | 114 | 115 | 116 | 117 | 118 | 119 | 120 | 121 | 122 | 123 | 124 | 125 | 126 | 127 | 128 | 129 | 130 | 131 | 132 | 133 | 134 | 135 | 136 | 137 | 138 | 139 | 140 | 141 | 142 | 143 | 144 | 145 | 146 | 147 | 148 | 149 | 150 | 151 | 152 | 153 | 154 | 155 | 156 | 157 | 158 | 159 | 160 | 161 | 162 | 163 | 164 | 165 | 166 | 167 | 168 | 169 | 170 | 171 | 172 | 173 | 174 | 175 | 176 | 177 | 178 | 179 | 180 | 181 | 182 | 183 | 184 | 185 | 186 | 187 | 188 | 189 | 190 | 191 | 192 | 193 | 194 | 195 | 196 | 197 | 198 | 199 | 200 | 201 | 202 | 203 | 204 | 205 | 206 | 207 | 208 | 209 | 210 | 211 | 212 | 213 | 214 | 215 | 216 | 217 | 218 | 219 | 220 | 221 | 222 | 223 | 224 | 225 | 226 | 227 | 228 | 229 | 230 | 231 | 232 | 233 | 234 | 235 | 236 | 237 | 238 | 239 | 240 | 241 | 242 | 243 | 244 | 245 | 246 | 247 | 248 | 249 | 250 | 251 | 252 | 253 | 254 | 255 | 256 | 257 | 258 | 259 | 260 | 261 | 262 | 263 | 264 | 265 | 266 | 267 | 268 | 269 | 270 | 271 | 272 | 273 | 274 | 275 | 276 | 277 | 278 | 279 | 280 | 281 | 282 | 283 | 284 | 285 | 286 | 287 | 288 | 289 | 290 | 291 | 292 | 293 | 294 | 295 | 296 | 297 | 298 | 299 | 300 | 301 | 302 | 303 | 304 | 305 | 306 | 307 | 308 | 309 | 310 | 311 | 312 | 313 | 314 | 315 | 316 | 317 | 318 | 319 | 320 | 321 | 322 | 323 | 324 | 325 | 326 | 327 | 328 | 329 | 330 | 331 | 332 | 333 | 334 | 335 | 336 | 337 | 338 | 339 | 340 | 341 | 342 | 343 | 344 | 345 | 346 | 347 | 348 | 349 | 350 | 351 | 352 | 353 | 354 | 355 | 356 | 357 | 358 | 359 | 360 | 361 | 362 | 363 | 364 | 365 | 366 | 367 | 368 | 369 | 370 | 371 | 372 | 373 | 374 | 375 | 376 | 377 | 378 | 379 | 380 | 381 | 382 | 383 | 384 | 385 | 386 | 387 | 388 | 389 | 390 | 391 | 392 | 393 | 394 | 395 | 396 | 397 | 398 | 399 | 400 | 401 | 402 | 403 | 404 | 405 | 406 | 407 | 408 | 409 | 410 | 411 | 412 | 413 | 414 | 415 | 416 | 417 | 418 | 419 | 420 | 421 | 422 | 423 | 424 | 425 | 426 | 427 | 428 | 429 | 430 | 431 | 432 | 433 | 434 | 435 | 436 | 437 | 438 | 439 | 440 | 441 | 442 | 443 | 444 | 445 | 446 | 447 | 448 | 449 | 450 | 451 | 452 | 453 | 454 | 455 | 456 | 457 | 458 | 459 | 460 | 461 | 462 | 463 | 464 | 465 | 466 | 467 | 468 | 469 | 470 | 471 | 472 | 473 | 474 | 475 | 476 | 477 | 478 | 479 | 480 | 481 | 482 | 483 | 484 | 485 | 486 | 487 | 488 | 489 | 490 | 491 | 492 | 493 | 494 | 495 | 496 | 497 | 498 | 499 | 500 | 501 | 502 | 503 | 504 | 505 | 506 | 507 | 508 | 509 | 510 | 511 | 512 | 513 | 514 | 515 | 516 | 517 | 518 | 519 | 520 | 521 | 522 | 523 | 524 | 525 | 526 | 527 | 528 | 529 | 530 | 531 | 532 | 533 | 534 | 535 | 536 | 537 | 538 | 539 | 540 | 541 | 542 | 543 | 544 | 545 | 546 | 547 | 548 | 549 | 550 | 551 | 552 | 553 | 554 | 555 | 556 | 557 | 558 | 559 | 560 | 561 | 562 | 563 | 564 | 565 | 566 | 567 | 568 | 569 | 570 | 571 | 572 | 573 | 574 | 575 | 576 | 577 | 578 | 579 | 580 | 581 | 582 | 583 | 584 | 585 | 586 | 587 | 588 | 589 | 590 | 591 | 592 | 593 | 594 | 595 | 596 | 597 | 598 | 599 | 600 | 601 | 602 | 603 | 604 | 605 | 606 | 607 | 608 | 609 | 610 | 611 | 612 | 613 | 614 | 615 | 616 | 617 | 618 | 619 | 620 | 621 | 622 | 623 | 624 | 625 | 626 | 627 | 628 | 629 | 630 | 631 | 632 | 633 | 634 | 635 | 636 | 637 | 638 | 639 | 640 | 641 | 642 | 643 | 644 | 645 | 646 | 647 | 648 | 649 | 650 | 651 | 652 | 653 | 654 | 655 | 656 | 657 | 658 | 659 | 660 | 661 | 662 | 663 | 664 | 665 | 666 | 667 | 668 | 669 | 670 | 671 | 672 | 673 | 674 | 675 | 676 | 677 | 678 | 679 | 680 | 681 | 682 | 683 | 684 | 685 | 686 | 687 | 688 | 689 | 690 | 691 | 692 | 693 | 694 | 695 | 696 | 697 | 698 | 699 | 700 | 701 | 702 | 703 | 704 | 705 | 706 | 707 | 708 | 709 | 710 | 711 | 712 | 713 | 714 | 715 | 716 | 717 | 718 | 719 | 720 | 721 | 722 | 723 | 724 | 725 | 726 | 727 | 728 | 729 | 730 | 731 | 732 | 733 | 734 | 735 | 736 | 737 | 738 | 739 | 740 | 741 | 742 | 743 | 744 | 745 | 746 | 747 | 748 | 749 | 750 | 751 | 752 | 753 | 754 | 755 | 756 | 757 | 758 | 759 | 760 | 761 | 762 | 763 | 764 | 765 | 766 | 767 | 768 | 769 | 770 | 771 | 772 | 773 | 774 | 775 | 776 | 777 | 778 | 779 | 780 | 781 | 782 | 783 | 784 | 785 | 786 | 787 | 788 | 789 | 790 | 791 | 792 | 793 | 794 | 795 | 796 | 797 | 798 | 799 | 800 | 801 | 802 | 803 | 804 | 805 | 806 | 807 | 808 | 809 | 810 | 811 | 812 | 813 | 814 | 815 | 816 | 817 | 818 | 819 | 820 | 821 | 822 | 823 | 824 | 825 | 826 | 827 | 828 | 829 | 830 | 831 | 832 | 833 | 834 | 835 | 836 | 837 | 838 | 839 | 840 | 841 | 842 | 843 | 844 | 845 | 846 | 847 | 848 | 849 | 850 | 851 | 852 | 853 | 854 | 855 | 856 | 857 | 858 | 859 | 860 | 861 | 862 | 863 | 864 | 865 | 866 | 867 | 868 | 869 | 870 | 871 | 872 | 873 | 874 | 875 | 876 | 877 | 878 | 879 | 880 | 881 | 882 | 883 | 884 | 885 | 886 | 887 | 888 | 889 | 890 | 891 | 892 | 893 | 894 | 895 | 896 | 897 | 898 | 899 | 900 | 901 | 902 | 903 | 904 | 905 | 906 | 907 | 908 | 909 | 910 | 911 | 912 | 913 | 914 | 915 | 916 | 917 | 918 | 919 | 920 | 921 | 922 | 923 | 924 | 925 | 926 | 927 | 928 | 929 | 930 | 931 | 932 | 933 | 934 | 935 | 936 | 937 | 938 | 939 | 940 | 941 | 942 | 943 | 944 | 945 | 946 | 947 | 948 | 949 | 950 | 951 | 952 | 953 | 954 | 955 | 956 | 957 | 958 | 959 | 960 | 961 | 962 | 963 | 964 | 965 | 966 | 967 | 968 | 969 | 970 | 971 | 972 | 973 | 974 | 975 | 976 | 977 | 978 | 979 | 980 | 981 | 982 | 983 | 984 | 985 | 986 | 987 | 988 | 989 | 990 | 991 | 992 | 993 | 994 | 995 | 996 | 997 | 998 | 999 | 1000 | 1001 | 1002 | 1003 | 1004 | 1005 | 1006 | 1007 | 1008 | 1009 | 1010 | 1011 | 1012 | 1013 | 1014 | 1015 | 1016 | 1017 | 1018 | 1019 | 1020 | 1021 | 1022 | 1023 | 1024 | 1025 | 1026 | 1027 | 1028 | 1029 | 1030 | 1031 | 1032 | 1033 | 1034 | 1035 | 1036 | 1037 | 1038 | 1039 | 1040 | 1041 | 1042 | 1043 | 1044 | 1045 | 1046 | 1047 | 1048 | 1049 | 1050 | 1051 | 1052 | 1053 | 1054 | 1055 | 1056 | 1057 | 1058 | 1059 | 1060 | 1061 | 1062 | 1063 | 1064 | 1065 | 1066 | 1067 | 1068 | 1069 | 1070 | 1071 | 1072 | 1073 | 1074 | 1075 | 1076 | 1077 | 1078 | 1079 | 1080 | 1081 | 1082 | 1083 | 1084 | 1085 | 1086 | 1087 | 1088 | 1089 | 1090 | 1091 | 1092 | 1093 | 1094 | 1095 | 1096 | 1097 | 1098 | 1099 | 1100 | 1101 | 1102 | 1103 | 1104 | 1105 | 1106 | 1107 | 1108 | 1109 | 1110 | 1111 | 1112 | 1113 | 1114 | 1115 | 1116 | 1117 | 1118 | 1119 | 1120 | 1121 | 1122 | 1123 | 1124 | 1125 | 1126 | 1127 | 1128 | 1129 | 1130 | 1131 | 1132 | 1133 | 1134 | 1135 | 1136 | 1137 | 1138 | 1139 | 1140 | 1141 | 1142 | 1143 | 1144 | 1145 | 1146 | 1147 | 1148 | 1149 | 1150 | 1151 | 1152 | 1153 | 1154 | 1155 | 1156 | 1157 | 1158 | 1159 | 1160 | 1161 | 1162 | 1163 | 1164 | 1165 | 1166 | 1167 | 1168 | 1169 | 1170 | 1171 | 1172 | 1173 | 1174 | 1175 | 1176 | 1177 | 1178 | 1179 | 1180 | 1181 | 1182 | 1183 | 1184 | 1185 | 1186 | 1187 | 1188 | 1189 | 1190 | 1191 | 1192 | 1193 | 1194 | 1195 | 1196 | 1197 | 1198 | 1199 | 1200 | 1201 | 1202 | 1203 | 1204 | 1205 | 1206 | 1207 | 1208 | 1209 | 1210 | 1211 | 1212 | 1213 | 1214 | 1215 | 1216 | 1217 | 1218 | 1219 | 1220 | 1221 | 1222 | 1223 | 1224 | 1225 | 1226 | 1227 | 1228 | 1229 | 1230 | 1231 | 1232 | 1233 | 1234 | 1235 | 1236 | 1237 | 1238 | 1239 | 1240 | 1241 | 1242 | 1243 | 1244 | 1245 | 1246 | 1247 | 1248 | 1249 | 1250 | 1251 | 1252 | 1253 | 1254 | 1255 | 1256 | 1257 | 1258 | 1259 | 1260 | 1261 | 1262 | 1263 | 1264 | 1265 | 1266 | 1267 | 1268 | 1269 | 1270 | 1271 | 1272 | 1273 | 1274 | 1275 | 1276 | 1277 | 1278 | 1279 | 1280 | 1281 | 1282 | 1283 | 1284 | 1285 | 1286 | 1287 | 1288 | 1289 | 1290 | 1291 | 1292 | 1293 | 1294 | 1295 | 1296 | 1297 | 1298 | 1299 | 1300 | 1301 | 1302 | 1303 | 1304 | 1305 | 1306 | 1307 | 1308 | 1309 | 1310 | 1311 | 1312 | 1313 | 1314 | 1315 | 1316 | 1317 | 1318 | 1319 | 1320 | 1321 | 1322 | 1323 | 1324 | 1325 | 1326 | 1327 | 1328 | 1329 | 1330 | 1331 | 1332 | 1333 | 1334 | 1335 | 1336 | 1337 | 1338 | 1339 | 1340 | 1341 | 1342 | 1343 | 1344 | 1345 | 1346 | 1347 | 1348 | 1349 | 1350 | 1351 | 1352 | 1353 | 1354 | 1355 | 1356 | 1357 | 1358 | 1359 | 1360 | 1361 | 1362 | 1363 | 1364 | 1365 | 1366 | 1367 | 1368 | 1369 | 1370 | 1371 | 1372 | 1373 | 1374 | 1375 | 1376 | 1377 | 1378 | 1379 | 1380 | 1381 | 1382 | 1383 | 1384 | 1385 | 1386 | 1387 | 1388 | 1389 | 1390 | 1391 | 1392 | 1393 | 1394 | 1395 | 1396 | 1397 | 1398 | 1399 | 1400 | 1401 | 1402 | 1403 | 1404 | 1405 | 1406 | 1407 | 1408 | 1409 | 1410 | 1411 | 1412 | 1413 | 1414 | 1415 | 1416 | 1417 | 1418 | 1419 | 1420 | 1421 | 1422 | 1423 | 1424 | 1425 | 1426 | 1427 | 1428 | 1429 | 1430 | 1431 | 1432 | 1433 | 1434 | 1435 | 1436 | 1437 | 1438 | 1439 | 1440 | 1441 | 1442 | 1443 | 1444 | 1445 | 1446 | 1447 | 1448 | 1449 | 1450 | 1451 | 1452 | 1453 | 1454 | 1455 | 1456 | 1457 | 1458 | 1459 | 1460 | 1461 | 1462 | 1463 | 1464 | 1465 | 1466 | 1467 | 1468 | 1469 | 1470 | 1471 | 1472 | 1473 | 1474 | 1475 | 1476 | 1477 | 1478 | 1479 | 1480 | 1481 | 1482 | 1483 | 1484 | 1485 | 1486 | 1487 | 1488 | 1489 | 1490 | 1491 | 1492 | 1493 | 1494 | 1495 | 14 |
|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|----|

1. The first step is to identify the problem or question that needs to be answered. This involves understanding the context and the specific requirements of the task.

2. The second step is to gather relevant information and data. This may involve research, consultation with experts, or collecting data from various sources.

3. The third step is to analyze the information and data collected. This involves identifying patterns, trends, and relationships that can help in understanding the problem.

4. The fourth step is to develop a solution or answer. This involves applying the analysis to the problem and proposing a course of action.

5. The fifth step is to implement the solution. This involves putting the proposed course of action into practice and monitoring the results.

6. The sixth step is to evaluate the results. This involves assessing the effectiveness of the solution and identifying any areas for improvement.

7. The seventh step is to communicate the results. This involves sharing the findings and conclusions with the relevant stakeholders.

8. The eighth step is to reflect on the process. This involves thinking about what worked well and what could be done better next time.

Figure 1. The effect of the number of trials on the number of correct responses. The number of correct responses was significantly higher than the number of incorrect responses in all conditions. The number of correct responses was significantly higher than the number of incorrect responses in all conditions. The number of correct responses was significantly higher than the number of incorrect responses in all conditions.

1. *Journal of the American Medical Association*, 1997; 277: 1033-1038.

1. The first step is to identify the variables that are being measured. In this case, the variables are the number of hours spent on each activity (reading, writing, and thinking) and the total number of hours spent on all activities.

| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|--------|
| 2019 | 2018 | 2017 | 2016 | 2015 | 2014 | 2013 | 2012 | 2011 | 2010 | 2009 | 2008 | 2007 | 2006 | 2005 | 2004 | 2003 | 2002 | 2001 | 2000 | 1999 | 1998 | 1997 | 1996 | 1995 | 1994 | 1993 | 1992 | 1991 | 1990 | 1989 | 1988 | 1987 | 1986 | 1985 | 1984 | 1983 | 1982 | 1981 | 1980 | 1979 | 1978 | 1977 | 1976 | 1975 | 1974 | 1973 | 1972 | 1971 | 1970 | 1969 | 1968 | 1967 | 1966 | 1965 | 1964 | 1963 | 1962 | 1961 | 1960 | 1959 | 1958 | 1957 | 1956 | 1955 | 1954 | 1953 | 1952 | 1951 | 1950 | 1949 | 1948 | 1947 | 1946 | 1945 | 1944 | 1943 | 1942 | 1941 | 1940 | 1939 | 1938 | 1937 | 1936 | 1935 | 1934 | 1933 | 1932 | 1931 | 1930 | 1929 | 1928 | 1927 | 1926 | 1925 | 1924 | 1923 | 1922 | 1921 | 1920 | 1919 | 1918 | 1917 | 1916 | 1915 | 1914 | 1913 | 1912 | 1911 | 1910 | 1909 | 1908 | 1907 | 1906 | 1905 | 1904 | 1903 | 1902 | 1901 | 1900 | 1899 | 1898 | 1897 | 1896 | 1895 | 1894 | 1893 | 1892 | 1891 | 1890 | 1889 | 1888 | 1887 | 1886 | 1885 | 1884 | 1883 | 1882 | 1881 | 1880 | 1879 | 1878 | 1877 | 1876 | 1875 | 1874 | 1873 | 1872 | 1871 | 1870 | 1869 | 1868 | 1867 | 1866 | 1865 | 1864 | 1863 | 1862 | 1861 | 1860 | 1859 | 1858 | 1857 | 1856 | 1855 | 1854 | 1853 | 1852 | 1851 | 1850 | 1849 | 1848 | 1847 | 1846 | 1845 | 1844 | 1843 | 1842 | 1841 | 1840 | 1839 | 1838 | 1837 | 1836 | 1835 | 1834 | 1833 | 1832 | 1831 | 1830 | 1829 | 1828 | 1827 | 1826 | 1825 | 1824 | 1823 | 1822 | 1821 | 1820 | 1819 | 1818 | 1817 | 1816 | 1815 | 1814 | 1813 | 1812 | 1811 | 1810 | 1809 | 1808 | 1807 | 1806 | 1805 | 1804 | 1803 | 1802 | 1801 | 1800 | 1799 | 1798 | 1797 | 1796 | 1795 | 1794 | 1793 | 1792 | 1791 | 1790 | 1789 | 1788 | 1787 | 1786 | 1785 | 1784 | 1783 | 1782 | 1781 | 1780 | 1779 | 1778 | 1777 | 1776 | 1775 | 1774 | 1773 | 1772 | 1771 | 1770 | 1769 | 1768 | 1767 | 1766 | 1765 | 1764 | 1763 | 1762 | 1761 | 1760 | 1759 | 1758 | 1757 | 1756 | 1755 | 1754 | 1753 | 1752 | 1751 | 1750 | 1749 | 1748 | 1747 | 1746 | 1745 | 1744 | 1743 | 1742 | 1741 | 1740 | 1739 | 1738 | 1737 | 1736 | 1735 | 1734 | 1733 | 1732 | 1731 | 1730 | 1729 | 1728 | 1727 | 1726 | 1725 | 1724 | 1723 | 1722 | 1721 | 1720 | 1719 | 1718 | 1717 | 1716 | 1715 | 1714 | 1713 | 1712 | 1711 | 1710 | 1709 | 1708 | 1707 | 1706 | 1705 | 1704 | 1703 | 1702 | 1701 | 1700 | 1699 | 1698 | 1697 | 1696 | 1695 | 1694 | 1693 | 1692 | 1691 | 1690 | 1689 | 1688 | 1687 | 1686 | 1685 | 1684 | 1683 | 1682 | 1681 | 1680 | 1679 | 1678 | 1677 | 1676 | 1675 | 1674 | 1673 | 1672 | 1671 | 1670 | 1669 | 1668 | 1667 | 1666 | 1665 | 1664 | 1663 | 1662 | 1661 | 1660 | 1659 | 1658 | 1657 | 1656 | 1655 | 1654 | 1653 | 1652 | 1651 | 1650 | 1649 | 1648 | 1647 | 1646 | 1645 | 1644 | 1643 | 1642 | 1641 | 1640 | 1639 | 1638 | 1637 | 1636 | 1635 | 1634 | 1633 | 1632 | 1631 | 1630 | 1629 | 1628 | 1627 | 1626 | 1625 | 1624 | 1623 | 1622 | 1621 | 1620 | 1619 | 1618 | 1617 | 1616 | 1615 | 1614 | 1613 | 1612 | 1611</ |
|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|--------|

1997, 1998, 1999, 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016, 2017, 2018, 2019, 2020, 2021, 2022, 2023, 2024, 2025, 2026, 2027, 2028, 2029, 2030, 2031, 2032, 2033, 2034, 2035, 2036, 2037, 2038, 2039, 2040, 2041, 2042, 2043, 2044, 2045, 2046, 2047, 2048, 2049, 2050, 2051, 2052, 2053, 2054, 2055, 2056, 2057, 2058, 2059, 2060, 2061, 2062, 2063, 2064, 2065, 2066, 2067, 2068, 2069, 2070, 2071, 2072, 2073, 2074, 2075, 2076, 2077, 2078, 2079, 2080, 2081, 2082, 2083, 2084, 2085, 2086, 2087, 2088, 2089, 2090, 2091, 2092, 2093, 2094, 2095, 2096, 2097, 2098, 2099, 2100, 2101, 2102, 2103, 2104, 2105, 2106, 2107, 2108, 2109, 2110, 2111, 2112, 2113, 2114, 2115, 2116, 2117, 2118, 2119, 2120, 2121, 2122, 2123, 2124, 2125, 2126, 2127, 2128, 2129, 2130, 2131, 2132, 2133, 2134, 2135, 2136, 2137, 2138, 2139, 2140, 2141, 2142, 2143, 2144, 2145, 2146, 2147, 2148, 2149, 2150, 2151, 2152, 2153, 2154, 2155, 2156, 2157, 2158, 2159, 2160, 2161, 2162, 2163, 2164, 2165, 2166, 2167, 2168, 2169, 2170, 2171, 2172, 2173, 2174, 2175, 2176, 2177, 2178, 2179, 2180, 2181, 2182, 2183, 2184, 2185, 2186, 2187, 2188, 2189, 2190, 2191, 2192, 2193, 2194, 2195, 2196, 2197, 2198, 2199, 2200, 2201, 2202, 2203, 2204, 2205, 2206, 2207, 2208, 2209, 2210, 2211, 2212, 2213, 2214, 2215, 2216, 2217, 2218, 2219, 2220, 2221, 2222, 2223, 2224, 2225, 2226, 2227, 2228, 2229, 2230, 2231, 2232, 2233, 2234, 2235, 2236, 2237, 2238, 2239, 2240, 2241, 2242, 2243, 2244, 2245, 2246, 2247, 2248, 2249, 2250, 2251, 2252, 2253, 2254, 2255, 2256, 2257, 2258, 2259, 2260, 2261, 2262, 2263, 2264, 2265, 2266, 2267, 2268, 2269, 2270, 2271, 2272, 2273, 2274, 2275, 2276, 2277, 2278, 2279, 2280, 2281, 2282, 2283, 2284, 2285, 2286, 2287, 2288, 2289, 2290, 2291, 2292, 2293, 2294, 2295, 2296, 2297, 2298, 2299, 2300, 2301, 2302, 2303, 2304, 2305, 2306, 2307, 2308, 2309, 2310, 2311, 2312, 2313, 2314, 2315, 2316, 2317, 2318, 2319, 2320, 2321, 2322, 2323, 2324, 2325, 2326, 2327, 2328, 2329, 2330, 2331, 2332, 2333, 2334, 2335, 2336, 2337, 2338, 2339, 2340, 2341, 2342, 2343, 2344, 2345, 2346, 2347, 2348, 2349, 2350, 2351, 2352, 2353, 2354, 2355, 2356, 2357, 2358, 2359, 2360, 2361, 2362, 2363, 2364, 2365, 2366, 2367, 2368, 2369, 2370, 2371, 2372, 2373, 2374, 2375, 2376, 2377, 2378, 2379, 2380, 2381, 2382, 2383, 2384, 2385, 2386, 2387, 2388, 2389, 2390, 2391, 2392, 2393, 2394, 2395, 2396, 2397, 2398, 2399, 2400, 2401, 2402, 2403, 2404, 2405, 2406, 2407, 2408, 2409, 2410, 2411, 2412, 2413, 2414, 2415, 2416, 2417, 2418, 2419, 2420, 2421, 2422, 2423, 2424, 2425, 2426, 2427, 2428, 2429, 2430, 2431, 2432, 2433, 2434, 2435, 2436, 2437, 2438, 2439, 2440, 2441, 2442, 2443, 2444, 2445, 2446, 2447, 2448, 2449, 2450, 2451, 2452, 2453, 2454, 2455, 2456, 2457, 2458, 2459, 2460, 2461, 2462, 2463, 2464, 2465, 2466, 2467, 2468, 2469, 2470, 2471, 2472, 2473, 2474, 2475, 2476, 2477, 2478, 2479, 2480, 2481, 2482, 2483, 2484, 2485, 2486, 2487, 2488, 2489, 2490, 2491, 2492, 2493, 2494, 2495, 2496, 2497, 2498, 2499, 2500, 2501, 2502, 2503, 2504, 2505, 2506, 2507, 2508, 2509, 2510, 2511, 2512, 2513, 2514, 2515, 2516, 2517, 2518, 2519, 2520, 2521, 2522, 2523, 2524, 2525, 2526, 2527, 2528, 2529, 2530, 2531, 2532, 2533, 2534, 2535, 2536, 2537, 2538, 2539, 2540, 2541, 2542, 2543, 2544, 2545, 2546, 2547, 2548, 2549, 2550, 2551, 2552, 2553, 2554, 2555, 2556, 2557, 2558, 2559, 2560, 2561, 2562, 2563, 2564, 2565, 2566, 2567, 2568, 2569, 2570, 2571, 2572, 2573, 2574, 2575, 2576, 2577, 2578, 2579, 2580, 2581, 2582, 2583, 2584, 2585, 2586, 2587, 2588, 2589, 2590, 2591, 2592, 2593, 2594, 2595, 2596, 2597, 2598, 2599, 2600, 2601, 2602, 2603, 2604, 2605, 2606, 2607, 2608, 2609, 2610, 2611, 2612, 2613, 2614, 2615, 2616, 2617, 2618, 2619, 2620, 2621, 2622, 2623, 2624, 2625, 2626, 2627, 2628, 2629, 2630, 2631, 2632, 2633, 2634, 2635, 2636, 2637, 2638, 2639, 2640, 2641, 2642, 2643, 2644, 2645, 2646, 2647, 2648, 2649, 2650, 2651, 2652, 2653, 2654, 2655, 2656, 2657, 2658, 2659, 2660, 2661, 2662, 2663, 2664, 2665, 2666, 2667, 2668, 2669, 2670, 2671, 2672, 2673, 2674, 2675, 2676, 2677, 2678, 26

1. The first part of the document is a list of the names of the members of the committee.

2. The second part of the document is a list of the names of the members of the committee.

3. The third part of the document is a list of the names of the members of the committee.

4. The fourth part of the document is a list of the names of the members of the committee.

5. The fifth part of the document is a list of the names of the members of the committee.

6. The sixth part of the document is a list of the names of the members of the committee.

7. The seventh part of the document is a list of the names of the members of the committee.

8. The eighth part of the document is a list of the names of the members of the committee.

9. The ninth part of the document is a list of the names of the members of the committee.

10. The tenth part of the document is a list of the names of the members of the committee.

11. The eleventh part of the document is a list of the names of the members of the committee.

12. The twelfth part of the document is a list of the names of the members of the committee.

13. The thirteenth part of the document is a list of the names of the members of the committee.

14. The fourteenth part of the document is a list of the names of the members of the committee.

15. The fifteenth part of the document is a list of the names of the members of the committee.

16. The sixteenth part of the document is a list of the names of the members of the committee.

17. The seventeenth part of the document is a list of the names of the members of the committee.

18. The eighteenth part of the document is a list of the names of the members of the committee.

19. The nineteenth part of the document is a list of the names of the members of the committee.

20. The twentieth part of the document is a list of the names of the members of the committee.

21. The twenty-first part of the document is a list of the names of the members of the committee.

22. The twenty-second part of the document is a list of the names of the members of the committee.

23. The twenty-third part of the document is a list of the names of the members of the committee.

24. The twenty-fourth part of the document is a list of the names of the members of the committee.

25. The twenty-fifth part of the document is a list of the names of the members of the committee.

26. The twenty-sixth part of the document is a list of the names of the members of the committee.

27. The twenty-seventh part of the document is a list of the names of the members of the committee.

28. The twenty-eighth part of the document is a list of the names of the members of the committee.

29. The twenty-ninth part of the document is a list of the names of the members of the committee.

30. The thirtieth part of the document is a list of the names of the members of the committee.

31. The thirty-first part of the document is a list of the names of the members of the committee.

32. The thirty-second part of the document is a list of the names of the members of the committee.

33. The thirty-third part of the document is a list of the names of the members of the committee.

34. The thirty-fourth part of the document is a list of the names of the members of the committee.

35. The thirty-fifth part of the document is a list of the names of the members of the committee.

36. The thirty-sixth part of the document is a list of the names of the members of the committee.

37. The thirty-seventh part of the document is a list of the names of the members of the committee.

38. The thirty-eighth part of the document is a list of the names of the members of the committee.

1. The first part of the document discusses the importance of maintaining accurate records of all transactions and activities. It emphasizes the need for transparency and accountability in financial reporting.

2. The second part of the document outlines the various methods and techniques used to collect and analyze data. It includes a detailed description of the experimental procedures and the statistical analysis performed.

3. The third part of the document presents the results of the study. It includes a series of tables and graphs that illustrate the findings of the research. The data shows a clear trend of increasing activity over time, which is consistent with the hypothesis.

4. The fourth part of the document discusses the implications of the findings. It suggests that the results have significant implications for the field of study and may lead to further research in this area.

5. The fifth part of the document concludes the study. It summarizes the key findings and provides a final statement on the importance of the research.

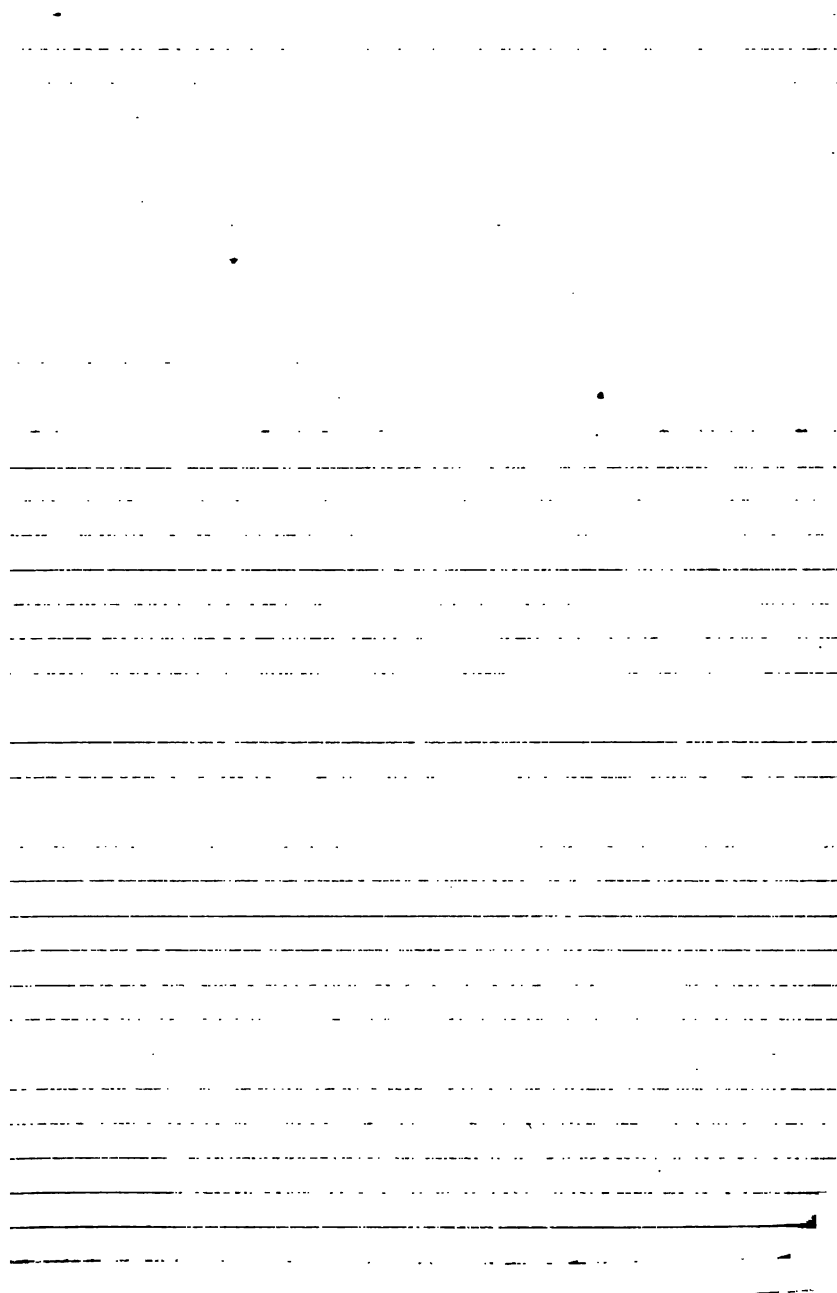
6. The sixth part of the document includes a list of references and a list of figures. The references cite the works of other researchers in the field, and the figures provide a visual representation of the data.

7. The seventh part of the document includes a list of tables and a list of equations. The tables provide a detailed breakdown of the data, and the equations provide a mathematical representation of the findings.

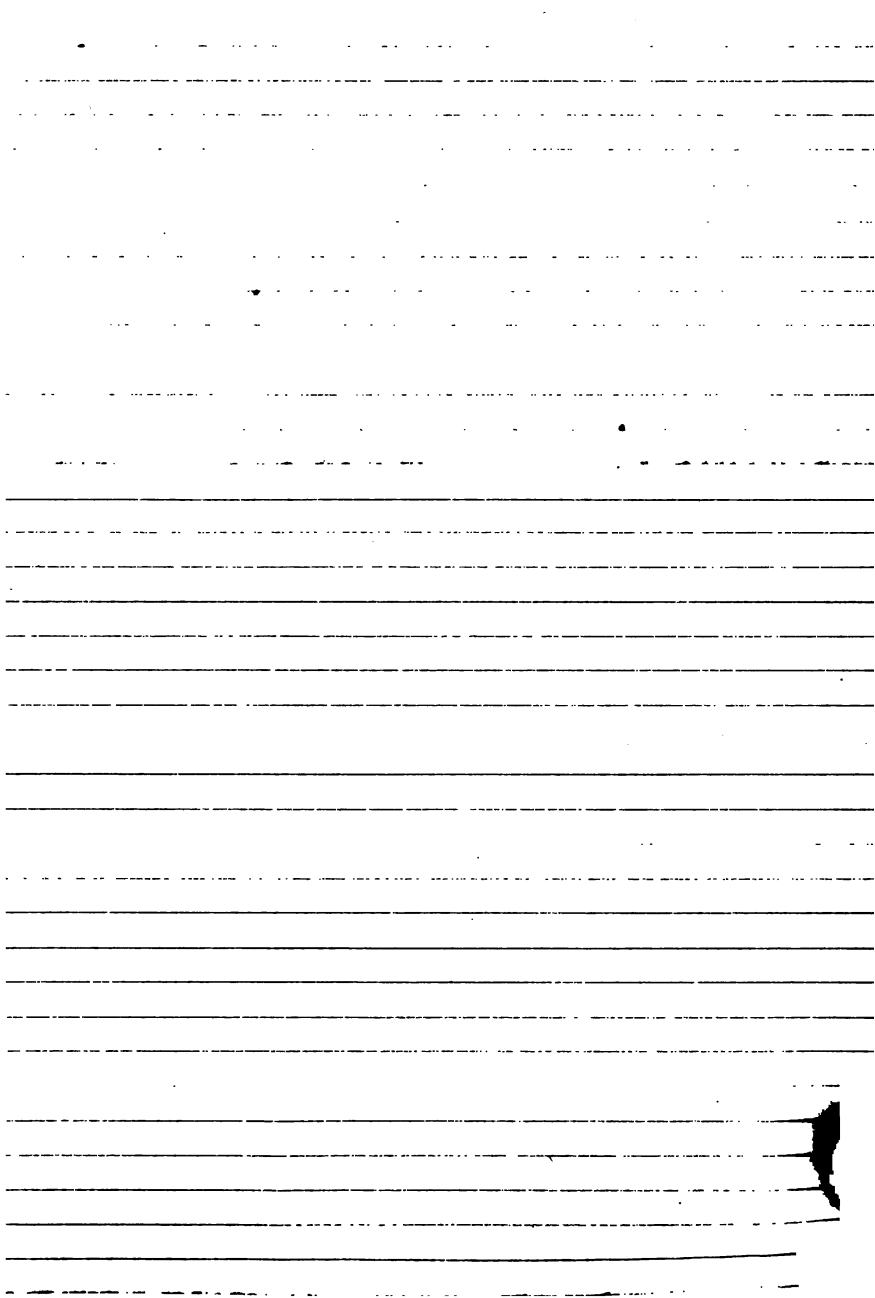
8. The eighth part of the document includes a list of appendices and a list of footnotes. The appendices provide additional information and data, and the footnotes provide further details on the research.

9. The ninth part of the document includes a list of acknowledgments and a list of authors. The acknowledgments thank the individuals and organizations that supported the research, and the authors list the individuals who conducted the study.

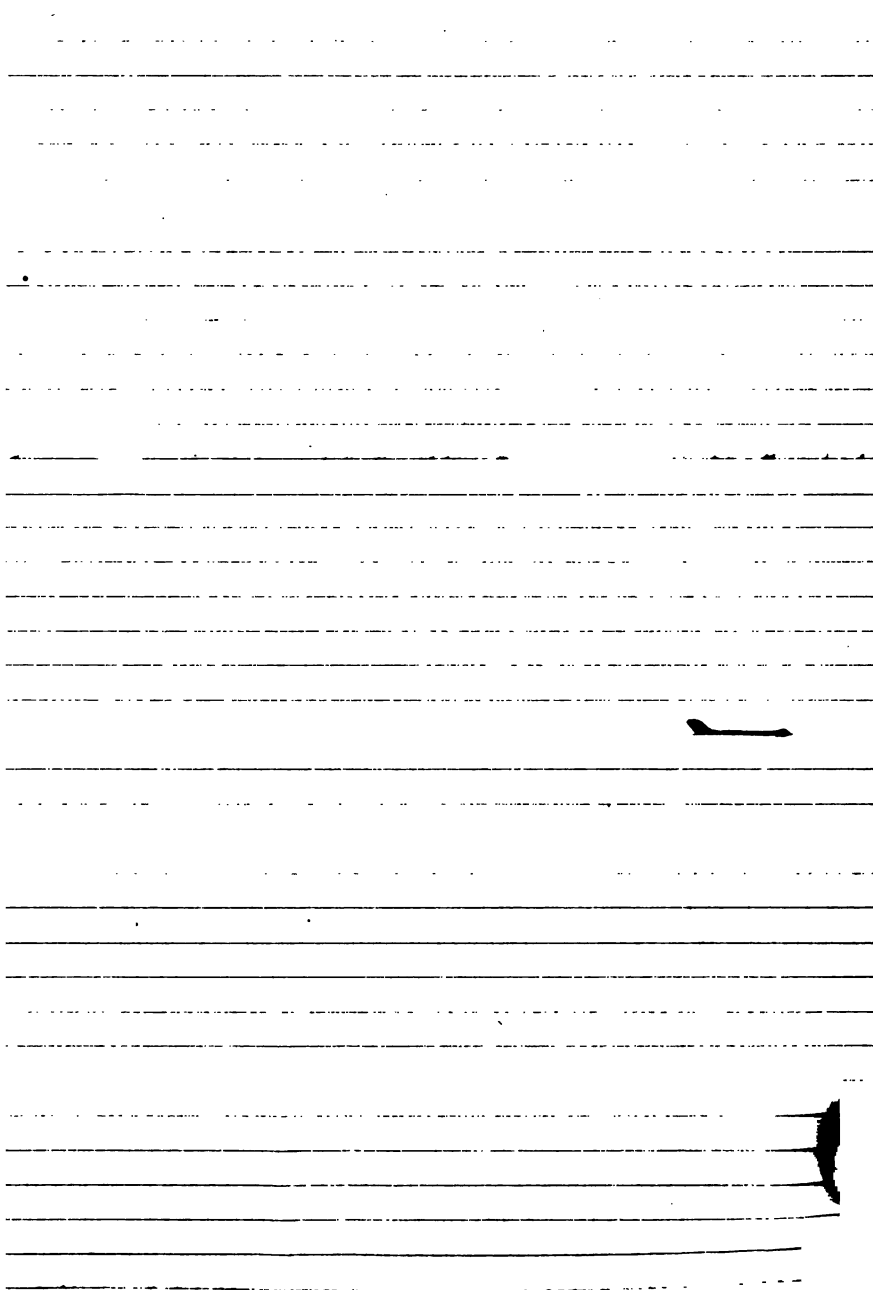
10. The tenth part of the document includes a list of references and a list of figures. The references cite the works of other researchers in the field, and the figures provide a visual representation of the data.











1. The first step in the process of creating a new product is to identify a market need. This involves conducting market research to determine what consumers want and what problems they are trying to solve.

2. Once a market need has been identified, the next step is to develop a concept for a product that addresses that need. This involves brainstorming ideas and selecting the most promising one.

3. The third step is to create a prototype of the product. This allows the designer to test the product and make any necessary adjustments before moving forward with production.

4. The fourth step is to conduct a feasibility study. This involves evaluating the product's potential for success in the market, taking into account factors such as cost, competition, and distribution.

5. The fifth step is to develop a business plan. This document outlines the company's goals, strategies, and financial projections, providing a roadmap for the product's development and launch.

6. The sixth step is to secure funding. This involves pitching the product to potential investors or lenders to obtain the capital needed to develop and launch the product.

7. The seventh step is to manufacture the product. This involves working with a manufacturer to produce the product in large quantities, ensuring quality control throughout the process.

8. The eighth step is to launch the product. This involves marketing the product to the target audience, distributing it through various channels, and monitoring its performance in the market.

9. The ninth step is to evaluate the product's success. This involves analyzing sales data, customer feedback, and other metrics to determine if the product is meeting its goals and if any further improvements are needed.

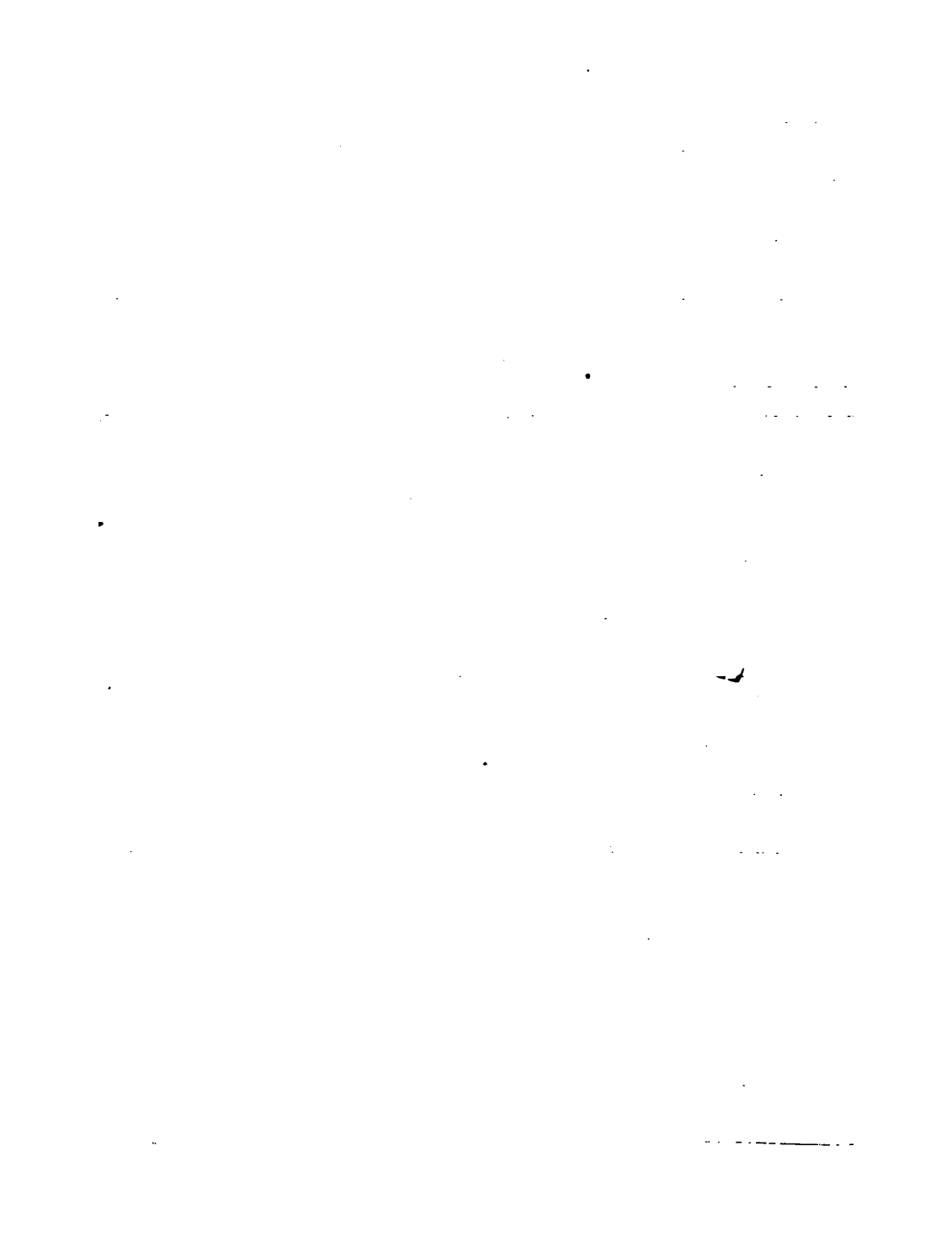
10. The tenth step is to iterate and improve the product. Based on the evaluation, the designer may make changes to the product to enhance its features, address customer concerns, or improve its overall quality.

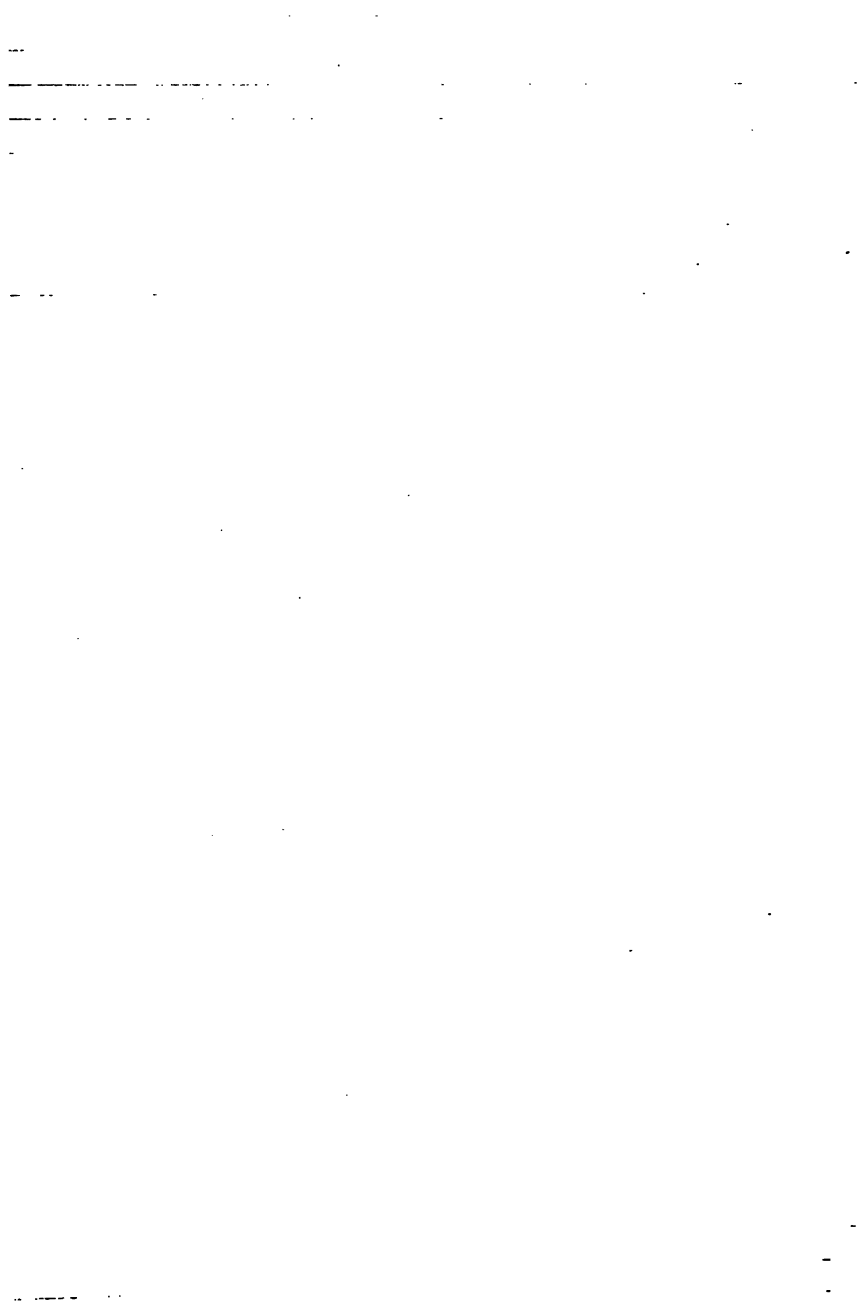
11. The eleventh step is to continue to monitor the product's performance. This involves staying up-to-date on market trends, competitor activities, and customer feedback to ensure the product remains competitive and relevant.

12. The twelfth step is to plan for the future. This involves identifying opportunities for new products or improvements to the current product, setting goals, and developing a strategy to achieve them.

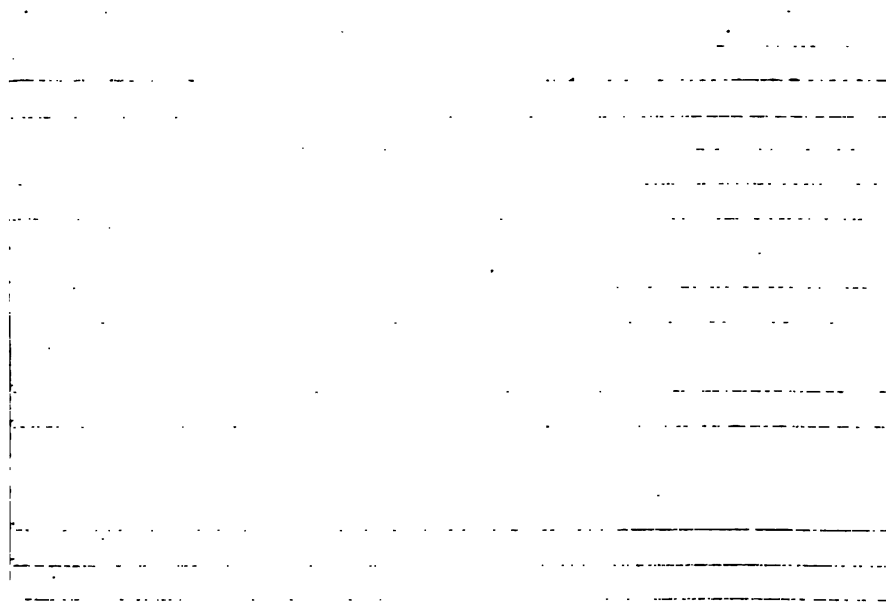
13. The thirteenth step is to celebrate success. Once the product has been successfully launched and is performing well, it's important to take time to celebrate the achievement and the hard work that went into creating it.













1. The first part of the document discusses the importance of maintaining accurate records of all transactions and activities. It emphasizes that proper record-keeping is essential for transparency and accountability, particularly in financial matters. The text notes that without reliable records, it is difficult to track progress, identify trends, and make informed decisions.

2. The second part of the document outlines the various methods and tools used to collect and analyze data. It mentions the use of surveys, interviews, and focus groups to gather qualitative information, as well as the application of statistical software for quantitative analysis. The importance of ensuring the reliability and validity of the data sources is highlighted throughout this section.

3. The third part of the document describes the process of interpreting the collected data and drawing meaningful conclusions. It stresses the need for a systematic approach to data analysis, starting with a clear understanding of the research objectives and hypotheses. The text also discusses the importance of considering potential biases and limitations when interpreting the results.

4. The fourth part of the document provides a detailed overview of the findings and conclusions of the study. It presents the key results of the data analysis, supported by relevant statistics and visual representations. The conclusions drawn from the findings are presented in a clear and concise manner, highlighting the main insights and implications of the research.

5. The final part of the document discusses the limitations of the study and suggests areas for future research. It acknowledges that the study may have certain limitations, such as a limited sample size or a specific focus on a particular aspect of the phenomenon. The text suggests that future research could explore these areas further to provide a more comprehensive understanding of the topic.

1. The first step is to identify the problem or question that needs to be answered. This involves understanding the context and the specific requirements of the task.

2. The second step is to gather relevant information and data. This may involve research, consultation with experts, or collecting data from various sources.

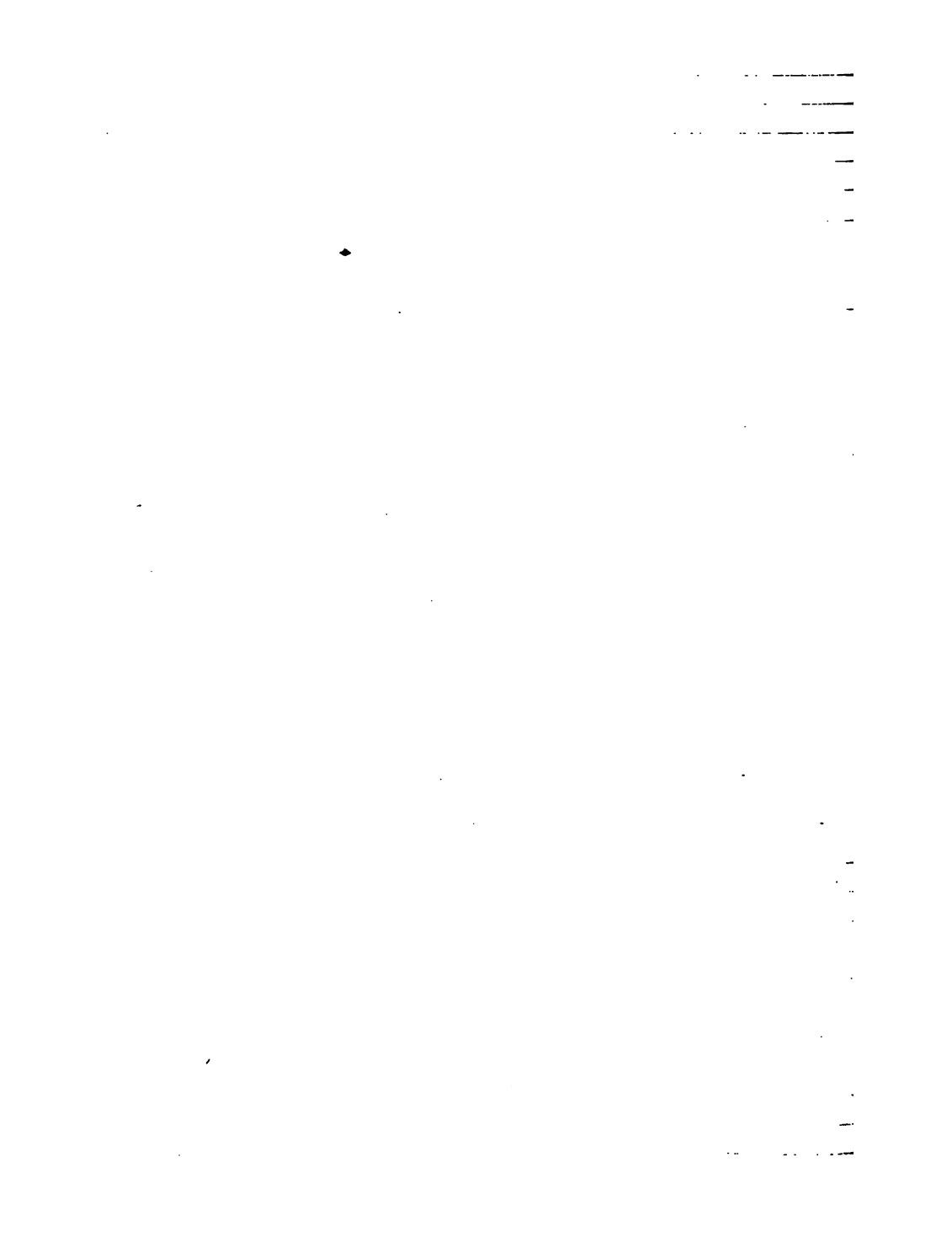
3. The third step is to analyze the information and data collected. This involves identifying patterns, trends, and relationships that can help in understanding the problem.

4. The fourth step is to develop a solution or answer. This involves applying the analysis to the problem and proposing a course of action.

5. The fifth step is to implement the solution. This involves putting the proposed solution into practice and monitoring its progress.

6. The sixth step is to evaluate the results. This involves assessing the effectiveness of the solution and making any necessary adjustments.

Blank lined paper with horizontal ruling lines.



—

11.

— — — — —

88

[illegible]

1000

—

—

[illegible]

— — — — —

Journal of Interpersonal Violence 31(12)

— — —

doi:10.1371/journal.pone.0142602.g002

• •

•

Abstract

•

[illegible]

2000 100 0

[illegible]

10. 11. 2016

[illegible]

| Category | 1990 | 1995 | 2000 | 2005 |
|--------------------------|----------|----------|----------|----------|
| 1. <i>Chlorophyll a</i> | 1.2 | 1.5 | 1.8 | 2.1 |
| 2. <i>Chlorophyll b</i> | 0.8 | 1.0 | 1.2 | 1.4 |
| 3. <i>Chlorophyll c</i> | 0.5 | 0.6 | 0.7 | 0.8 |
| 4. <i>Chlorophyll d</i> | 0.3 | 0.4 | 0.5 | 0.6 |
| 5. <i>Chlorophyll e</i> | 0.1 | 0.2 | 0.3 | 0.4 |
| 6. <i>Chlorophyll f</i> | 0.05 | 0.1 | 0.15 | 0.2 |
| 7. <i>Chlorophyll g</i> | 0.02 | 0.05 | 0.08 | 0.1 |
| 8. <i>Chlorophyll h</i> | 0.01 | 0.02 | 0.03 | 0.04 |
| 9. <i>Chlorophyll i</i> | 0.005 | 0.01 | 0.015 | 0.02 |
| 10. <i>Chlorophyll j</i> | 0.002 | 0.005 | 0.008 | 0.01 |
| 11. <i>Chlorophyll k</i> | 0.001 | 0.002 | 0.003 | 0.004 |
| 12. <i>Chlorophyll l</i> | 0.0005 | 0.001 | 0.0015 | 0.002 |
| 13. <i>Chlorophyll m</i> | 0.0002 | 0.0005 | 0.0008 | 0.001 |
| 14. <i>Chlorophyll n</i> | 0.0001 | 0.0002 | 0.0003 | 0.0004 |
| 15. <i>Chlorophyll o</i> | 0.00005 | 0.0001 | 0.00015 | 0.0002 |
| 16. <i>Chlorophyll p</i> | 0.00002 | 0.00005 | 0.00008 | 0.0001 |
| 17. <i>Chlorophyll q</i> | 0.00001 | 0.00002 | 0.00003 | 0.00004 |
| 18. <i>Chlorophyll r</i> | 0.000005 | 0.00001 | 0.000015 | 0.00002 |
| 19. <i>Chlorophyll s</i> | 0.000002 | 0.000005 | 0.000008 | 0.00001 |
| 20. <i>Chlorophyll t</i> | 0.000001 | 0.000002 | 0.000003 | 0.000004 |

[illegible]

—

1000

1000

| Age | Sex | Height (cm) | Weight (kg) | BMI (kg/m ²) | Waist circumference (cm) | Hypertension | Dyslipidemia | Diabetes | Family history of CVD | Clinical diagnosis |
|-----|-----|-------------|-------------|--------------------------|--------------------------|--------------|--------------|----------|-----------------------|--------------------|
| 60 | M | 178 | 95 | 29.8 | 102 | No | No | No | No | CHD |
| 65 | F | 165 | 75 | 27.9 | 95 | No | No | No | No | CHD |
| 70 | M | 170 | 85 | 29.4 | 100 | No | No | No | No | CHD |
| 75 | F | 160 | 70 | 27.8 | 90 | No | No | No | No | CHD |
| 80 | M | 175 | 90 | 28.9 | 105 | No | No | No | No | CHD |
| 85 | F | 162 | 72 | 27.9 | 92 | No | No | No | No | CHD |
| 90 | M | 172 | 88 | 29.2 | 103 | No | No | No | No | CHD |
| 95 | F | 164 | 74 | 27.9 | 94 | No | No | No | No | CHD |
| 100 | M | 176 | 92 | 29.3 | 106 | No | No | No | No | CHD |

• • •

... ..

... ..

... ..

... ..

... ..

... ..

... ..

... ..

... ..

... ..

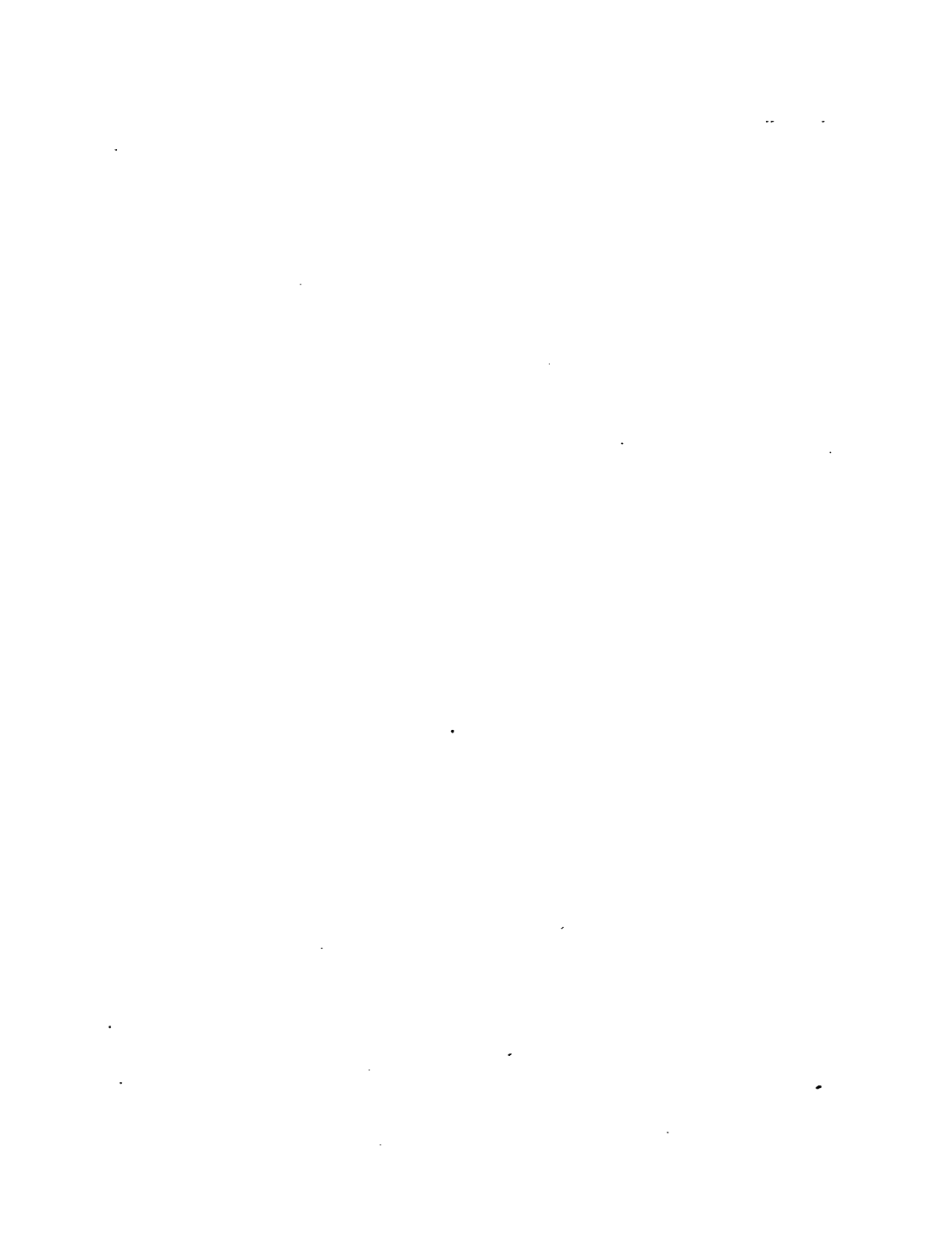
... ..

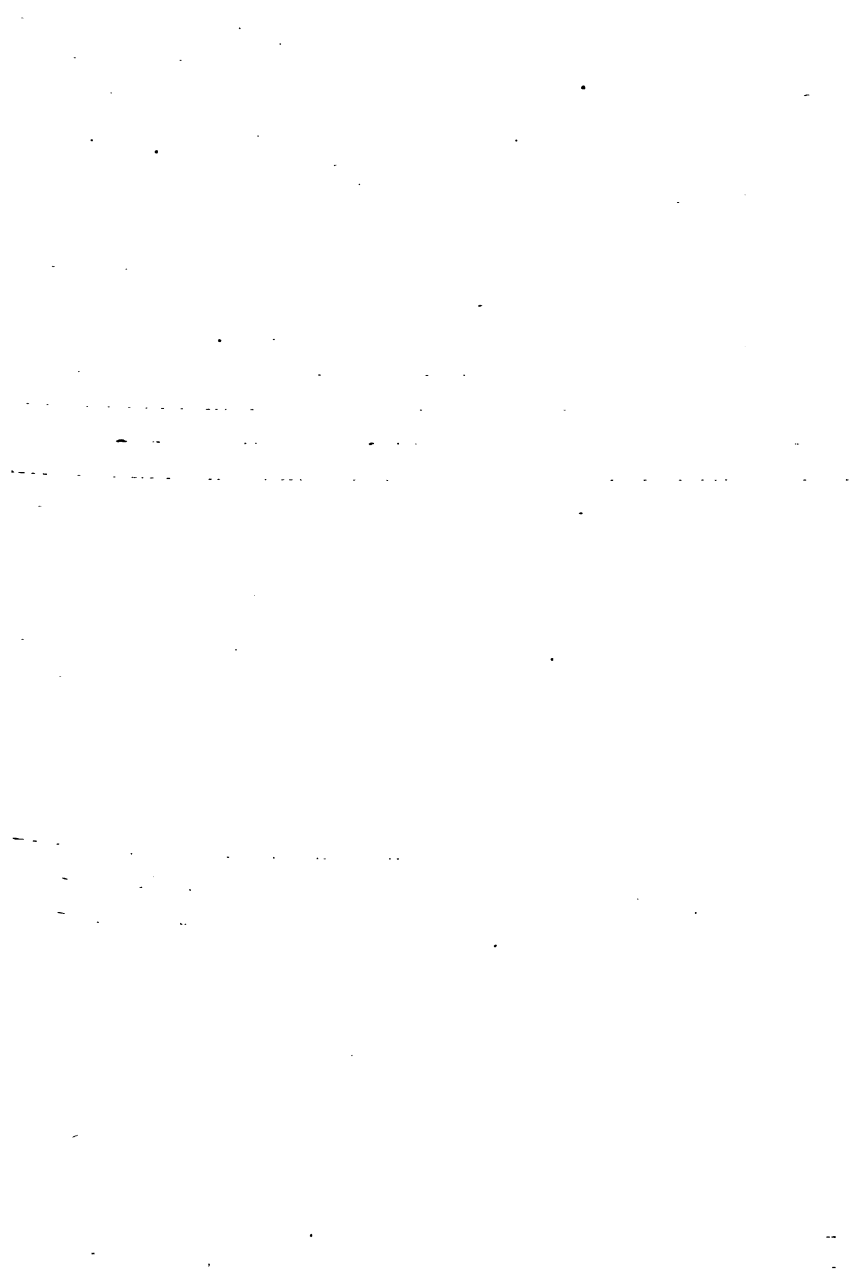
... ..

... ..

... ..







1



| Date | Description | Amount | Total |
|------|-------------|--------|--------|
| 1911 | Jan 1 | 100.00 | 100.00 |
| 1912 | Jan 1 | 100.00 | 100.00 |
| 1913 | Jan 1 | 100.00 | 100.00 |
| 1914 | Jan 1 | 100.00 | 100.00 |
| 1915 | Jan 1 | 100.00 | 100.00 |
| 1916 | Jan 1 | 100.00 | 100.00 |
| 1917 | Jan 1 | 100.00 | 100.00 |
| 1918 | Jan 1 | 100.00 | 100.00 |
| 1919 | Jan 1 | 100.00 | 100.00 |
| 1920 | Jan 1 | 100.00 | 100.00 |
| 1921 | Jan 1 | 100.00 | 100.00 |
| 1922 | Jan 1 | 100.00 | 100.00 |
| 1923 | Jan 1 | 100.00 | 100.00 |
| 1924 | Jan 1 | 100.00 | 100.00 |
| 1925 | Jan 1 | 100.00 | 100.00 |
| 1926 | Jan 1 | 100.00 | 100.00 |
| 1927 | Jan 1 | 100.00 | 100.00 |
| 1928 | Jan 1 | 100.00 | 100.00 |
| 1929 | Jan 1 | 100.00 | 100.00 |
| 1930 | Jan 1 | 100.00 | 100.00 |
| 1931 | Jan 1 | 100.00 | 100.00 |
| 1932 | Jan 1 | 100.00 | 100.00 |
| 1933 | Jan 1 | 100.00 | 100.00 |
| 1934 | Jan 1 | 100.00 | 100.00 |
| 1935 | Jan 1 | 100.00 | 100.00 |
| 1936 | Jan 1 | 100.00 | 100.00 |
| 1937 | Jan 1 | 100.00 | 100.00 |
| 1938 | Jan 1 | 100.00 | 100.00 |
| 1939 | Jan 1 | 100.00 | 100.00 |
| 1940 | Jan 1 | 100.00 | 100.00 |
| 1941 | Jan 1 | 100.00 | 100.00 |
| 1942 | Jan 1 | 100.00 | 100.00 |
| 1943 | Jan 1 | 100.00 | 100.00 |
| 1944 | Jan 1 | 100.00 | 100.00 |
| 1945 | Jan 1 | 100.00 | 100.00 |
| 1946 | Jan 1 | 100.00 | 100.00 |
| 1947 | Jan 1 | 100.00 | 100.00 |
| 1948 | Jan 1 | 100.00 | 100.00 |
| 1949 | Jan 1 | 100.00 | 100.00 |

1. The first step in the process of creating a new product is to identify a market need. This involves conducting market research to determine what consumers want and need. Once a need is identified, the next step is to develop a concept for a product that meets that need.

2. The second step is to develop a business plan for the new product. This plan should outline the company's goals, the target market, the competitive landscape, and the financial projections for the product. The business plan is a critical document that will guide the company's decision-making throughout the product development process.

3. The third step is to create a prototype of the product. This involves building a physical model of the product that can be used to test the design and gather feedback from potential customers. The prototype is a key tool for refining the product and ensuring it meets the needs of the market.

4. The fourth step is to conduct a pilot test of the product. This involves distributing the product to a small group of customers and gathering feedback on their experience. The pilot test is a valuable opportunity to identify any issues with the product and make adjustments before a full-scale launch.

5. The fifth step is to launch the product into the market. This involves creating a marketing campaign to promote the product and build awareness among potential customers. The launch is a critical moment for the company, as it determines the initial success of the product in the market.

6. The sixth step is to monitor the product's performance in the market. This involves tracking sales, customer feedback, and other key metrics to determine how well the product is performing. Monitoring performance is essential for identifying any issues and making adjustments to the product or marketing strategy as needed.

7. The seventh step is to iterate on the product based on feedback and performance data. This involves making changes to the product or marketing strategy based on what has been learned from the pilot test and market performance. Iteration is a key part of the product development process, as it allows the company to refine the product and improve its chances of success.

8. The eighth step is to scale the product and expand its reach. This involves increasing production and distribution to reach a larger market. Scaling the product is a critical step in the product development process, as it determines the long-term success of the product in the market.

9. The final step is to evaluate the overall success of the product development process. This involves assessing the product's performance, the company's financial results, and the overall impact of the product on the market. Evaluation is a key part of the product development process, as it allows the company to learn from its experience and improve its future product development efforts.



1. The first step is to identify the problem or question that needs to be answered.

2. The second step is to gather relevant information and data.

3. The third step is to analyze the information and data.

4. The fourth step is to develop a solution or answer.

5. The fifth step is to implement the solution or answer.

6. The sixth step is to evaluate the results of the solution or answer.

7. The seventh step is to communicate the results of the solution or answer.

8. The eighth step is to reflect on the process and learn from the experience.

9. The ninth step is to apply the lessons learned to future problems or questions.

10. The tenth step is to continue to learn and grow as a professional.

11. The eleventh step is to stay up-to-date on the latest developments in the field.

12. The twelfth step is to seek out opportunities for professional development.

13. The thirteenth step is to build a strong professional network.

14. The fourteenth step is to be open to feedback and criticism.

15. The fifteenth step is to be a team player and support your colleagues.

16. The sixteenth step is to be a leader and inspire others.

17. The seventeenth step is to be a mentor and guide others.

18. The eighteenth step is to be a role model and set a good example.

19. The nineteenth step is to be a change agent and drive positive change.

20. The twentieth step is to be a lifelong learner and never stop growing.

21. The twenty-first step is to be a professional and conduct yourself with integrity.

22. The twenty-second step is to be a team player and support your colleagues.

23. The twenty-third step is to be a leader and inspire others.

24. The twenty-fourth step is to be a mentor and guide others.

25. The twenty-fifth step is to be a role model and set a good example.

26. The twenty-sixth step is to be a change agent and drive positive change.

27. The twenty-seventh step is to be a lifelong learner and never stop growing.

28. The twenty-eighth step is to be a professional and conduct yourself with integrity.

29. The twenty-ninth step is to be a team player and support your colleagues.

30. The thirtieth step is to be a leader and inspire others.

31. The thirty-first step is to be a mentor and guide others.

32. The thirty-second step is to be a role model and set a good example.

33. The thirty-third step is to be a change agent and drive positive change.

34. The thirty-fourth step is to be a lifelong learner and never stop growing.



1. The first part of the document discusses the importance of maintaining accurate records of all transactions and activities. It emphasizes that proper record-keeping is essential for transparency and accountability, particularly in financial matters. The text outlines various methods for organizing and storing data, including digital databases and physical filing systems. It also mentions the need for regular audits and reviews to ensure the integrity of the information.

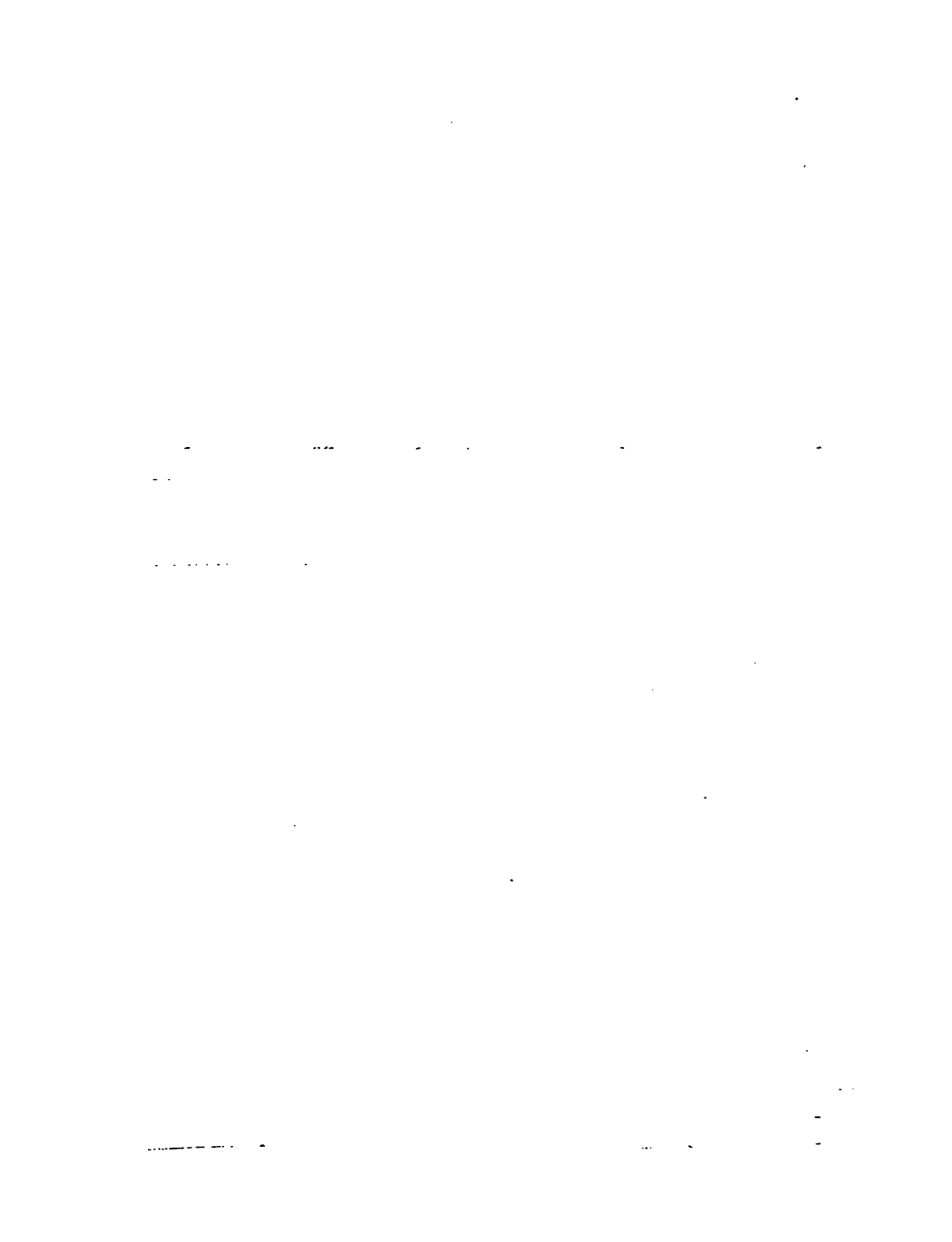
2. The second section focuses on the role of communication in achieving organizational goals. It highlights that effective communication is not just about conveying information but also about listening and understanding the needs of others. The text provides several strategies for improving communication, such as active listening, clear and concise messaging, and the use of appropriate channels. It also discusses the importance of fostering a culture of open communication and collaboration within the organization.

3. The third part of the document addresses the challenges of managing time and resources efficiently. It notes that time is a finite resource, and therefore, it is crucial to prioritize tasks and allocate resources wisely. The text offers practical tips for time management, including creating a schedule, setting deadlines, and delegating responsibilities. It also discusses the importance of monitoring progress and making adjustments as needed to stay on track.

4. The final section discusses the importance of continuous learning and professional development. It states that in a rapidly changing world, individuals and organizations must stay up-to-date with the latest trends and technologies. The text encourages a growth mindset and provides suggestions for how to pursue learning opportunities, such as attending workshops, conferences, and taking courses. It also emphasizes the value of mentorship and peer support in the learning process.











1







.....

.....

.....

.....

.....

.....

.....

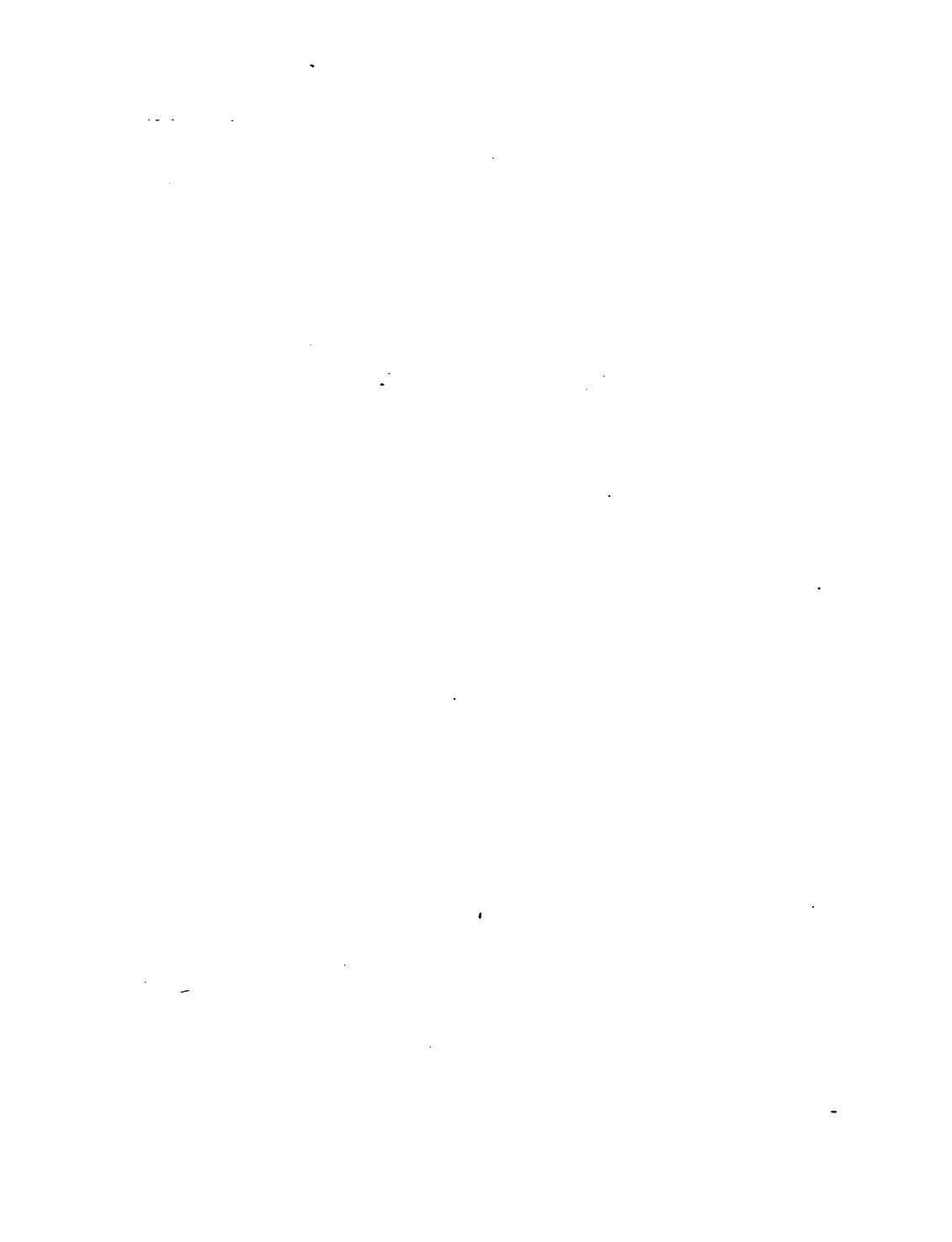
.....

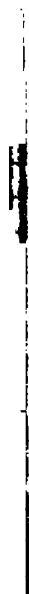
.....

.....

.....

1. *Journal of the American Medical Association*, 1997; 277: 1033-1038.

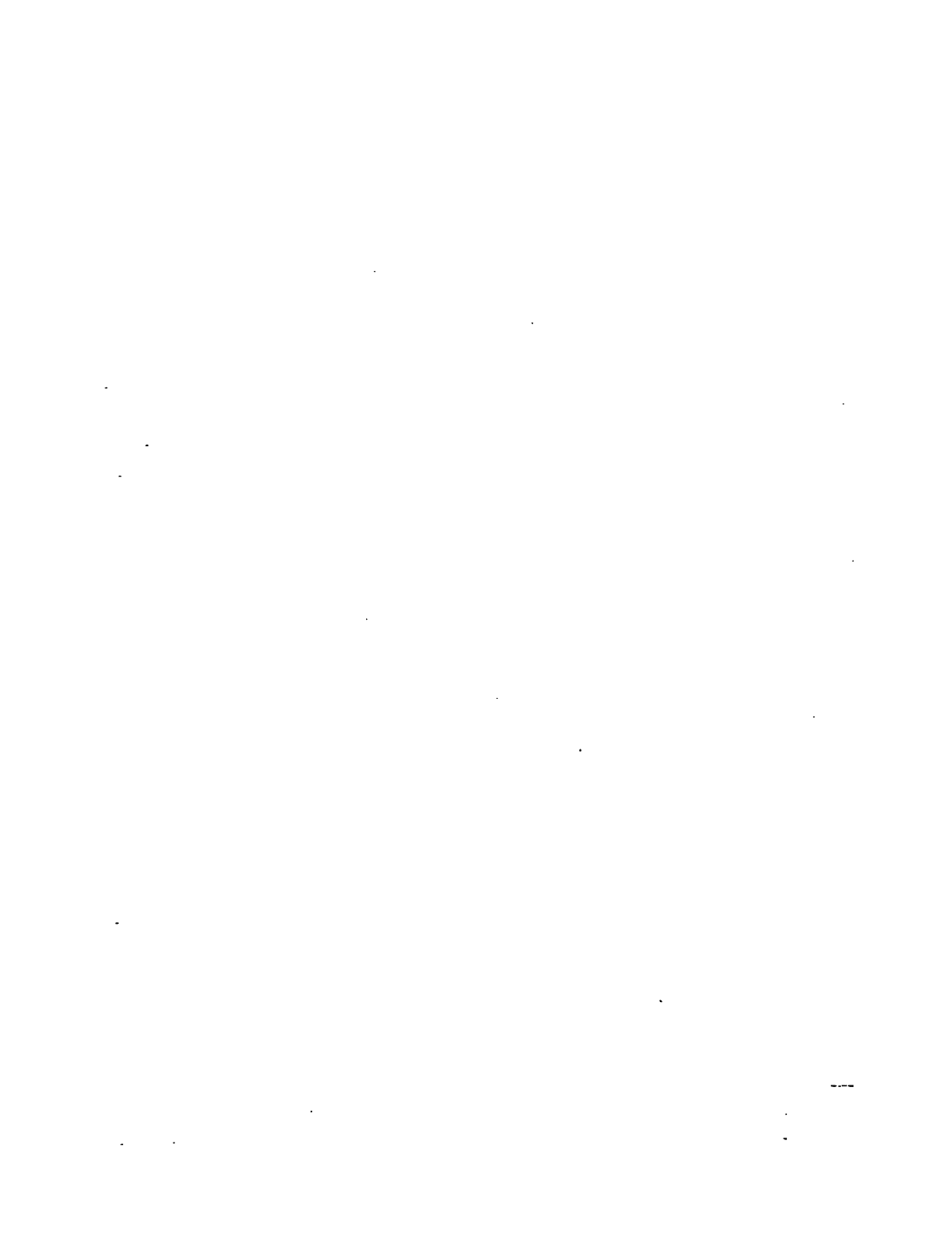








1





[illegible]

100 1 000 10

•

— — — — —

—

© 2000 Blackwell Science Ltd *Journal of Internal Medicine* 247: 391–397

—

Copyright © 2003 John Wiley & Sons, Inc.

_____ 2002 12 20 11

| Year | 1990 | 1995 | 2000 | 2005 |
|---------------------------|------|------|------|------|
| Population (millions) | 1.2 | 1.4 | 1.6 | 1.8 |
| GDP (billions of dollars) | 0.5 | 1.0 | 1.5 | 2.0 |
| Life expectancy (years) | 55 | 60 | 65 | 70 |

— • —

1000000 1000000 0

— — — — — 2 — — — — —

— — —

• • •

•

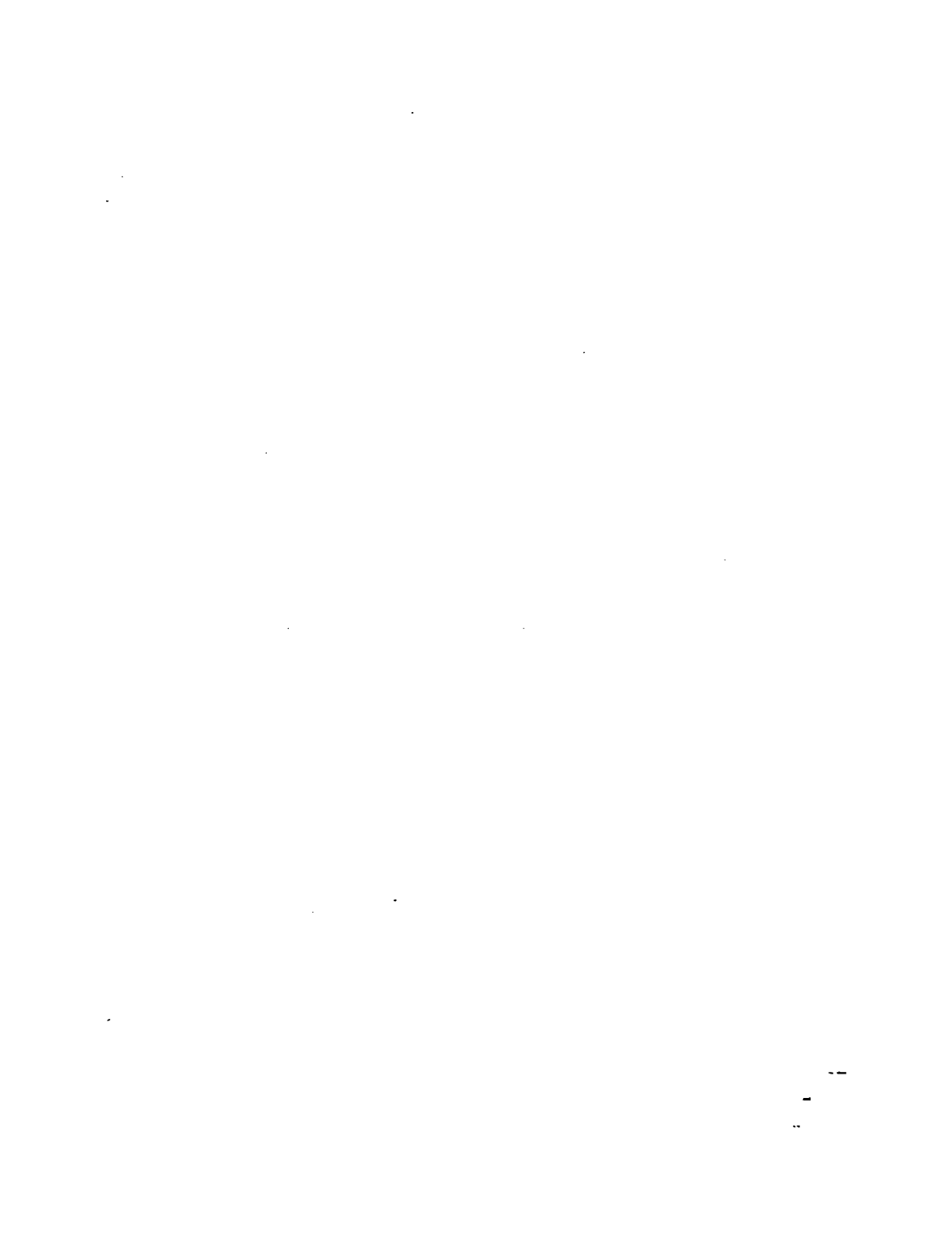
• • •

.. ..

— — — — —





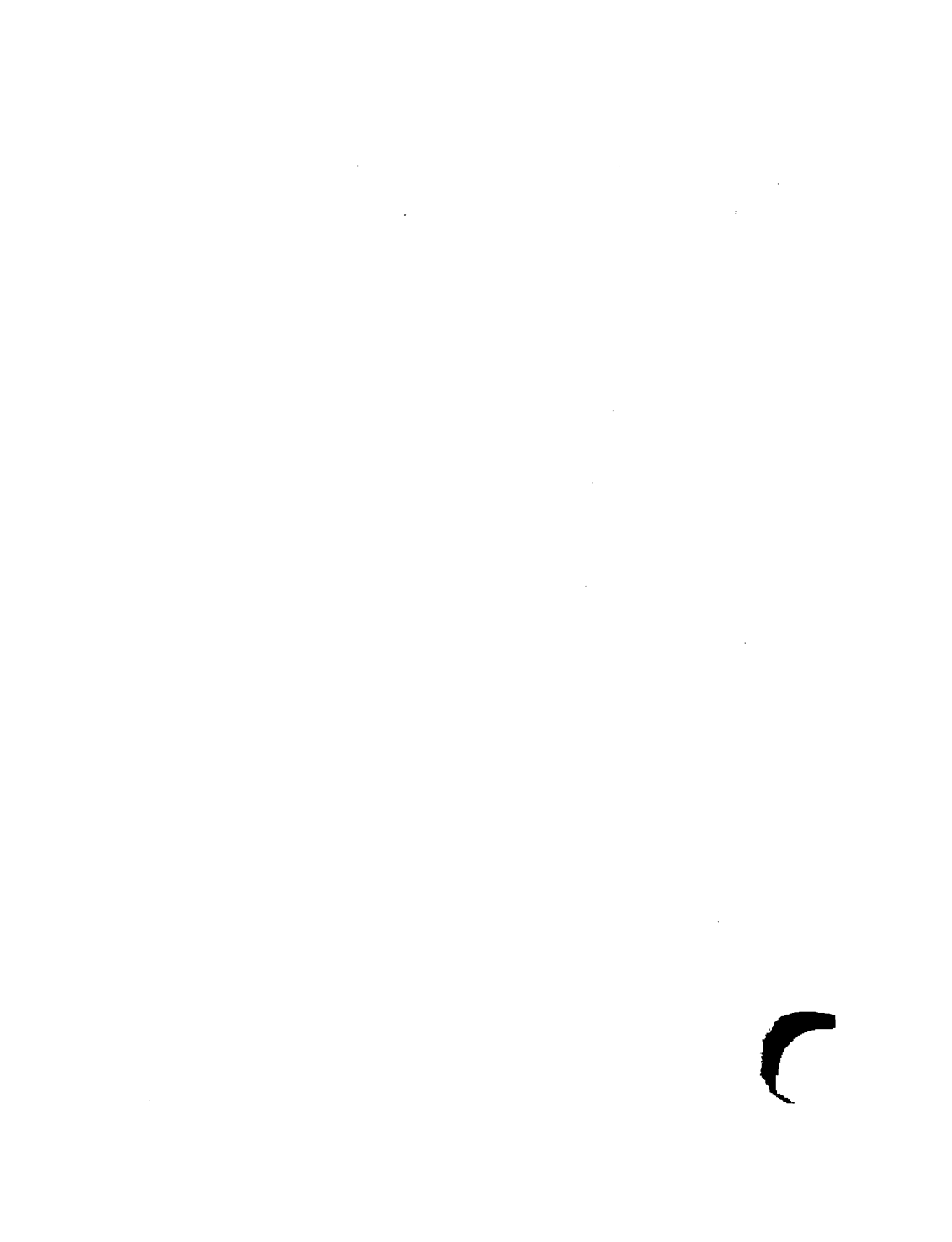






| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|----|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 | 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | 60 | 61 | 62 | 63 | 64 | 65 | 66 | 67 | 68 | 69 | 70 | 71 | 72 | 73 | 74 | 75 | 76 | 77 | 78 | 79 | 80 | 81 | 82 | 83 | 84 | 85 | 86 | 87 | 88 | 89 | 90 | 91 | 92 | 93 | 94 | 95 | 96 | 97 | 98 | 99 | 100 | 101 | 102 | 103 | 104 | 105 | 106 | 107 | 108 | 109 | 110 | 111 | 112 | 113 | 114 | 115 | 116 | 117 | 118 | 119 | 120 | 121 | 122 | 123 | 124 | 125 | 126 | 127 | 128 | 129 | 130 | 131 | 132 | 133 | 134 | 135 | 136 | 137 | 138 | 139 | 140 | 141 | 142 | 143 | 144 | 145 | 146 | 147 | 148 | 149 | 150 | 151 | 152 | 153 | 154 | 155 | 156 | 157 | 158 | 159 | 160 | 161 | 162 | 163 | 164 | 165 | 166 | 167 | 168 | 169 | 170 | 171 | 172 | 173 | 174 | 175 | 176 | 177 | 178 | 179 | 180 | 181 | 182 | 183 | 184 | 185 | 186 | 187 | 188 | 189 | 190 | 191 | 192 | 193 | 194 | 195 | 196 | 197 | 198 | 199 | 200 | 201 | 202 | 203 | 204 | 205 | 206 | 207 | 208 | 209 | 210 | 211 | 212 | 213 | 214 | 215 | 216 | 217 | 218 | 219 | 220 | 221 | 222 | 223 | 224 | 225 | 226 | 227 | 228 | 229 | 230 | 231 | 232 | 233 | 234 | 235 | 236 | 237 | 238 | 239 | 240 | 241 | 242 | 243 | 244 | 245 | 246 | 247 | 248 | 249 | 250 | 251 | 252 | 253 | 254 | 255 | 256 | 257 | 258 | 259 | 260 | 261 | 262 | 263 | 264 | 265 | 266 | 267 | 268 | 269 | 270 | 271 | 272 | 273 | 274 | 275 | 276 | 277 | 278 | 279 | 280 | 281 | 282 | 283 | 284 | 285 | 286 | 287 | 288 | 289 | 290 | 291 | 292 | 293 | 294 | 295 | 296 | 297 | 298 | 299 | 300 | 301 | 302 | 303 | 304 | 305 | 306 | 307 | 308 | 309 | 310 | 311 | 312 | 313 | 314 | 315 | 316 | 317 | 318 | 319 | 320 | 321 | 322 | 323 | 324 | 325 | 326 | 327 | 328 | 329 | 330 | 331 | 332 | 333 | 334 | 335 | 336 | 337 | 338 | 339 | 340 | 341 | 342 | 343 | 344 | 345 | 346 | 347 | 348 | 349 | 350 | 351 | 352 | 353 | 354 | 355 | 356 | 357 | 358 | 359 | 360 | 361 | 362 | 363 | 364 | 365 | 366 | 367 | 368 | 369 | 370 | 371 | 372 | 373 | 374 | 375 | 376 | 377 | 378 | 379 | 380 | 381 | 382 | 383 | 384 | 385 | 386 | 387 | 388 | 389 | 390 | 391 | 392 | 393 | 394 | 395 | 396 | 397 | 398 | 399 | 400 | 401 | 402 | 403 | 404 | 405 | 406 | 407 | 408 | 409 | 410 | 411 | 412 | 413 | 414 | 415 | 416 | 417 | 418 | 419 | 420 | 421 | 422 | 423 | 424 | 425 | 426 | 427 | 428 | 429 | 430 | 431 | 432 | 433 | 434 | 435 | 436 | 437 | 438 | 439 | 440 | 441 | 442 | 443 | 444 | 445 | 446 | 447 | 448 | 449 | 450 | 451 | 452 | 453 | 454 | 455 | 456 | 457 | 458 | 459 | 460 | 461 | 462 | 463 | 464 | 465 | 466 | 467 | 468 | 469 | 470 | 471 | 472 | 473 | 474 | 475 | 476 | 477 | 478 | 479 | 480 | 481 | 482 | 483 | 484 | 485 | 486 | 487 | 488 | 489 | 490 | 491 | 492 | 493 | 494 | 495 | 496 | 497 | 498 | 499 | 500 | 501 | 502 | 503 | 504 | 505 | 506 | 507 | 508 | 509 | 510 | 511 | 512 | 513 | 514 | 515 | 516 | 517 | 518 | 519 | 520 | 521 | 522 | 523 | 524 | 525 | 526 | 527 | 528 | 529 | 530 | 531 | 532 | 533 | 534 | 535 | 536 | 537 | 538 | 539 | 540 | 541 | 542 | 543 | 544 | 545 | 546 | 547 | 548 | 549 | 550 | 551 | 552 | 553 | 554 | 555 | 556 | 557 | 558 | 559 | 560 | 561 | 562 | 563 | 564 | 565 | 566 | 567 | 568 | 569 | 570 | 571 | 572 | 573 | 574 | 575 | 576 | 577 | 578 | 579 | 580 | 581 | 582 | 583 | 584 | 585 | 586 | 587 | 588 | 589 | 590 | 591 | 592 | 593 | 594 | 595 | 596 | 597 | 598 | 599 | 600 | 601 | 602 | 603 | 604 | 605 | 606 | 607 | 608 | 609 | 610 | 611 | 612 | 613 | 614 | 615 | 616 | 617 | 618 | 619 | 620 | 621 | 622 | 623 | 624 | 625 | 626 | 627 | 628 | 629 | 630 | 631 | 632 | 633 | 634 | 635 | 636 | 637 | 638 | 639 | 640 | 641 | 642 | 643 | 644 | 645 | 646 | 647 | 648 | 649 | 650 | 651 | 652 | 653 | 654 | 655 | 656 | 657 | 658 | 659 | 660 | 661 | 662 | 663 | 664 | 665 | 666 | 667 | 668 | 669 | 670 | 671 | 672 | 673 | 674 | 675 | 676 | 677 | 678 | 679 | 680 | 681 | 682 | 683 | 684 | 685 | 686 | 687 | 688 | 689 | 690 | 691 | 692 | 693 | 694 | 695 | 696 | 697 | 698 | 699 | 700 | 701 | 702 | 703 | 704 | 705 | 706 | 707 | 708 | 709 | 710 | 711 | 712 | 713 | 714 | 715 | 716 | 717 | 718 | 719 | 720 | 721 | 722 | 723 | 724 | 725 | 726 | 727 | 728 | 729 | 730 | 731 | 732 | 733 | 734 | 735 | 736 | 737 | 738 | 739 | 740 | 741 | 742 | 743 | 744 | 745 | 746 | 747 | 748 | 749 | 750 | 751 | 752 | 753 | 754 | 755 | 756 | 757 | 758 | 759 | 760 | 761 | 762 | 763 | 764 | 765 | 766 | 767 | 768 | 769 | 770 | 771 | 772 | 773 | 774 | 775 | 776 | 777 | 778 | 779 | 780 | 781 | 782 | 783 | 784 | 785 | 786 | 787 | 788 | 789 | 790 | 791 | 792 | 793 | 794 | 795 | 796 | 797 | 798 | 799 | 800 | 801 | 802 | 803 | 804 | 805 | 806 | 807 | 808 | 809 | 810 | 811 | 812 | 813 | 814 | 815 | 816 | 817 | 818 | 819 | 820 | 821 | 822 | 823 | 824 | 825 | 826 | 827 | 828 | 829 | 830 | 831 | 832 | 833 | 834 | 835 | 836 | 837 | 838 | 839 | 840 | 841 | 842 | 843 | 844 | 845 | 846 | 847 | 848 | 849 | 850 | 851 | 852 | 853 | 854 | 855 | 856 | 857 | 858 | 859 | 860 | 861 | 862 | 863 | 864 | 865 | 866 | 867 | 868 | 869 | 870 | 871 | 872 | 873 | 874 | 875 | 876 | 877 | 878 | 879 | 880 | 881 | 882 | 883 | 884 | 885 | 886 | 887 | 888 | 889 | 890 | 891 | 892 | 893 | 894 | 895 | 896 | 897 | 898 | 899 | 900 | 901 | 902 | 903 | 904 | 905 | 906 | 907 | 908 | 909 | 910 | 911 | 912 | 913 | 914 | 915 | 916 | 917 | 918 | 919 | 920 | 921 | 922 | 923 | 924 | 925 | 926 | 927 | 928 | 929 | 930 | 931 | 932 | 933 | 934 | 935 | 936 | 937 | 938 | 939 | 940 | 941 | 942 | 943 | 944 | 945 | 946 | 947 | 948 | 949 | 950 | 951 | 952 | 953 | 954 | 955 | 956 | 957 | 958 | 959 | 960 | 961 | 962 | 963 | 964 | 965 | 966 | 967 | 968 | 969 | 970 | 971 | 972 | 973 | 974 | 975 | 976 | 977 | 978 | 979 | 980 | 981 | 982 | 983 | 984 | 985 | 986 | 987 | 988 | 989 | 990 | 991 | 992 | 993 | 994 | 995 | 996 | 997 | 998 | 999 | 1000 | 1001 | 1002 | 1003 | 1004 | 1005 | 1006 | 1007 | 1008 | 1009 | 1010 | 1011 | 1012 | 1013 | 1014 | 1015 | 1016 | 1017 | 1018 | 1019 | 1020 | 1021 | 1022 | 1023 | 1024 | 1025 | 1026 | 1027 | 1028 | 1029 | 1030 | 1031 | 1032 | 1033 | 1034 | 1035 | 1036 | 1037 | 1038 | 1039 | 1040 | 1041 | 1042 | 1043 | 1044 | 1045 | 1046 | 1047 | 1048 | 1049 | 1050 | 1051 | 1052 | 1053 | 1054 | 1055 | 1056 | 1057 | 1058 | 1059 | 1060 | 1061 | 1062 | 1063 | 1064 | 1065 | 1066 | 1067 | 1068 | 1069 | 1070 | 1071 | 1072 | 1073 | 1074 | 1075 | 1076 | 1077 | 1078 | 1079 | 1080 | 1081 | 1082 | 1083 | 1084 | 1085 | 1086 | 1087 | 1088 | 1089 | 1090 | 1091 | 1092 | 1093 | 1094 | 1095 | 1096 | 1097 | 1098 | 1099 | 1100 | 1101 | 1102 | 1103 | 1104 | 1105 | 1106 | 1107 | 1108 | 1109 | 1110 | 1111 | 1112 | 1113 | 1114 | 1115 | 1116 | 1117 | 1118 | 1119 | 1120 | 1121 | 1122 | 1123 | 1124 | 1125 | 1126 | 1127 | 1128 | 1129 | 1130 | 1131 | 1132 | 1133 | 1134 | 1135 | 1136 | 1137 | 1138 | 1139 | 1140 | 1141 | 1142 | 1143 | 1144 | 1145 | 1146 | 1147 | 1148 | 1149 | 1150 | 1151 | 1152 | 1153 | 1154 | 1155 | 1156 | 1157 | 1158 | 1159 | 1160 | 1161 | 1162 | 1163 | 1164 | 1165 | 1166 | 1167 | 1168 | 1169 | 1170 | 1171 | 1172 | 1173 | 1174 | 1175 | 1176 | 1177 | 1178 | 1179 | 1180 | 1181 | 1182 | 1183 | 1184 | 1185 | 1186 | 1187 | 1188 | 1189 | 1190 | 1191 | 1192 | 1193 | 1194 | 1195 | 1196 | 1197 | 1198 | 1199 | 1200 | 1201 | 1202 | 1203 | 1204 | 1205 | 1206 | 1207 | 1208 | 1209 | 1210 | 1211 | 1212 | 1213 | 1214 | 1215 | 1216 | 1217 | 1218 | 1219 | 1220 | 1221 | 1222 | 1223 | 1224 | 1225 | 1226 | 1227 | 1228 | 1229 | 1230 | 1231 | 1232 | 1233 | 1234 | 1235 | 1236 | 1237 | 1238 | 1239 | 1240 | 1241 | 1242 | 1243 | 1244 | 1245 | 1246 | 1247 | 1248 | 1249 | 1250 | 1251 | 1252 | 1253 | 1254 | 1255 | 1256 | 1257 | 1258 | 1259 | 1260 | 1261 | 1262 | 1263 | 1264 | 1265 | 1266 | 1267 | 1268 | 1269 | 1270 | 1271 | 1272 | 1273 | 1274 | 1275 | 1276 | 1277 | 1278 | 1279 | 1280 | 1281 | 1282 | 1283 | 1284 | 1285 | 1286 | 1287 | 1288 | 1289 | 1290 | 1291 | 1292 | 1293 | 1294 | 1295 | 1296 | 1297 | 1298 | 1299 | 1300 | 1301 | 1302 | 1303 | 1304 | 1305 | 1306 | 1307 | 1308 | 1309 | 1310 | 1311 | 1312 | 1313 | 1314 | 1315 | 1316 | 1317 | 1318 | 1319 | 1320 | 1321 | 1322 | 1323 | 1324 | 1325 | 1326 | 1327 | 1328 | 1329 | 1330 | 1331 | 1332 | 1333 | 1334 | 1335 | 1336 | 1337 | 1338 | 1339 | 1340 | 1341 | 1342 | 1343 | 1344 | 1345 | 1346 | 1347 | 1348 | 1349 | 1350 | 1351 | 1352 | 1353 | 1354 | 1355 | 1356 | 1357 | 1358 | 1359 | 1360 | 1361 | 1362 | 1363 | 1364 | 1365 | 1366 | 1367 | 1368 | 1369 | 1370 | 1371 | 1372 | 1373 | 1374 | 1375 | 1376 | 1377 | 1378 | 1379 | 1380 | 1381 | 1382 | 1383 | 1384 | 1385 | 1386 | 1387 | 1388 | 1389 | 1390 | 1391 | 1392 | 1393 | 1394 | 1395 | 1396 | 1397 | 1398 | 1399 | 1400 | 1401 | 1402 | 1403 | 1404 | 1405 | 1406 | 1407 | 1408 | 1409 | 1410 | 1411 | 1412 | 1413 | 1414 | 1415 | 1416 | 1417 | 1418 | 1419 | 1420 | 1421 | 1422 | 1423 | 1424 | 1425 | 1426 | 1427 | 1428 | 1429 | 1430 | 1431 | 1432 | 1433 | 1434 | 1435 | 1436 | 1437 | 1438 | 1439 | 1440 | 1441 | 1442 | 1443 | 1444 | 1445 | 1446 | 1447 | 1448 | 1449 | 1450 | 1451 | 1452 | 1453 | 1454 | 1455 | 1456 | 1457 | 1458 | 1459 | 1460 | 1461 | 1462 | 1463 | 1464 | 1465 | 1466 | 1467 | 1468 | 1469 | 1470 | 1471 | 1472 | 1473 | 1474 | 1475 | 1476 | 1477 | 1478 | 1479 | 1480 | 1481 | 1482 | 1483 | 1484 | 1485 | 1486 | 1487 | 1488 | 1489 | 1490 | 14 |
|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|----|





1

1

107 27 1954

